GENERAL LIBRARY
UNIV. OF MICH.
SEP 1 0 1899

THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. FEBRUARY 2, 1899. CHICAGO, ILL. NUMBER 5

CLING-SURFACE

IS A Belt Dressing,

AND MORE,

WE GUARANTEE IT WILL STOP BELTS FROM SLIPPING.

KEEP THEM SOFT AND PLIABLE AND INCREASE THEIR POWER 20 PER CENT.

Order a Sample Can.

If not satisfactory it can be returned.

Cling-Surface Mfg. Co.,
9 Court St., Buffalo, N.Y.

The only reasons that higher prices are being constantly paid by the most prominent steam users in the United States for Cahall Boilers are—that they are better made, last longer, cost less for maintenance, show a higher efficiency and make drier steam than any other kind.

Send for illustrated catalogue.

Cahall Sales Department, Pittsburg, Pa.

THE HARRINGTON & KING PERFORATING CO.

Metals Perforated as Required

FOR SCREENS OF ALL KINDS FOR USE IN

Milling and Mining Machinery, Reduction and Concentrating Works, Woolen, Cotton, Paper and Pulp Mills, Rice, Flour and Cottonseed Oil Mills, Sugar and Malt Houses, Distilleries, Filter Presses, Stone, Coal and Ore Screens, Stamp Battery Screens, Brick and Tile Works, Filters, Spark Arresters, Gas and Water Works, Oil, Gas and Vapor Stoves, Coffee Machinery, Etc., Etc.

Standard Sizes Perforated Tin and Brass Always in Stock.

Main Office and Works: 226 North Union Street, Chicago, Ill., U.S.A.

Bristol's Patent Steel Belt LACING.

Most Perfect fastening for all kinds of Belting. Samples free.

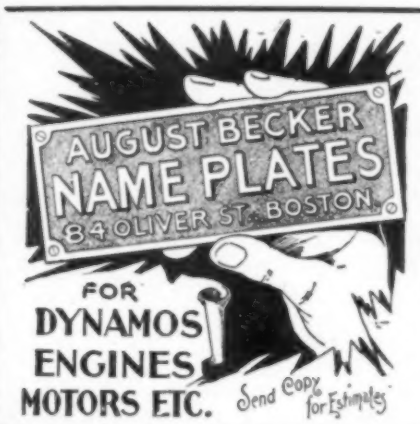
THE BRISTOL CO., Waterbury, Conn.

IT PAYS to advertise in The Iron Trade Review.

Demand, of Apollo, perfection: no less.

Whatever falls short, return to your dealer at his expense.

Apollo Iron and Steel Company
Pittsburgh



MINING ENGINEER, CHEMIST, ASSAYER.

BENEDICT CROWELL,
Atwater Building, Cleveland.

ENTERPRISE BOILER COMPANY
YOUNGSTOWN, O.

Draught Stacks, Blast Furnaces and Heavy Plate Work a Specialty.
Write for Estimates.

POWER TRANSMISSION
W. A. JONES FOUNDRY & MACHINE CO.
53-59 So. JEFFERSON ST. CHICAGO.

HONEST BABBITT METALS.

We do not claim that we are supplying ten different governments with Babbitt Metal. Our Metals are used by more than three thousand leading Consumers in UNCLE SAM'S own country. They are invariably uniform, reliable, contain only pure and best material, remarkably fluid, and free from "drossing."

PRICES TO ALL.—XXX Nickel Babbitt 24 cts. per lb.; No. 2 Grade (for general shop use), 10 cts. per lb.; F. O. B. your depot, on your customary terms. Any special mixture of metal made to order. 3,000 References.

SWARTS METAL REFINING CO., Office and Works, 20 N. Desplaines St., Chicago, Ill.

TURNBUCKLES.

Cleveland City Forge & Iron Co.,
CLEVELAND, O.

Blakeslee Steam Jet Pump.

REASONS FOR ITS USE:

1. Simplicity. 2. Is independent of engine. 3. Will pump sandy or impure water. 4. Have no valves and no wear. 5. Not subject to freezing. 6. Economy and reliability. 7. All parts interchangeable. Write

BLAKESLEE MFG. CO., Du Quoin, Ill.

LAKE SUPERIOR PIG IRON.

For Grey Iron, Malleable and Car Wheel Castings.

PURITAN

GENUINE CONNELLSVILLE COKE.

FORSTER, WATERBURY & CO.,
636-638 Rookery, CHICAGO

THE CHICAGO SCREW CO.

A NEW TOOL! Made in seven sizes.

MANUFACTURED ONLY BY
Armstrong Bros. Tool Co., 106 W. Wash. St., Chicago, Ill.

..Fire Brick..

Ground Clay A SPECIALTY.

Special Shapes.

THE UNION BOILER TUBE CLEANER CO.

231 Penn Ave., Pittsburg, Pa.

Has set the acknowledged standard for the World for cleaning all makes of boilers: also for flexible shafts of great strength and phenomenal durability under great stress. Write for particulars.

FUEL GAS PLANTS.

American Gas Furnace Co.,
23 John St., N. Y.

W. S. ROCKWELL & CO.,
OIL FURNACES.
26 Cortlandt St., New York City.

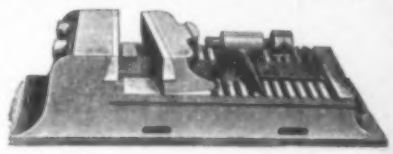
See large Advertisement of

B. F. STURTEVANT CO.,
Boston, Mass.,

On Page 25.

BLOWERS, FANS, ENGINES.

Chucks Work Instantly Parallel with Bed of Chuck



Massey's Planer and Drill Press Chuck.

MASSEY VISE CO., Chicago, Ill.

The A B C of Iron,

NOW $1.00.

THE UPSON NUT CO., Cleveland, O.

MANUFACTURERS OF

MACHINE AND CARRIAGE BOLTS, HOT FORCED AND COLD PUNCHED NUTS, LAG SCREWS, BOLT ENDS, WASHERS, ETC. Catalogue and Prices on Application.

Headquarters for ..... THE UPSON CO., Mines and Ovens in the Connellsville Coke Region, Penna. Post Office, PITTSBURG, PA.

GENUINE CONNELLSVILLE COKE

For Blast Furnaces and Foundry Cupola Work; also Crushed Connellsville Coke (substitute for Anthracite Coal) for manufacturing and domestic purposes. 13,500 Ovens. Daily Capacity 30,000 tons of Coke. Direct connections with all Railroads entering the Region. Quotations, Freight Rates, Pamphlets giving full information, promptly furnished on application.

Riveted Steel Pipe, Stand Pipes, Receivers.

WM. B. POLLOCK & CO.

with inquiry please give ad. No. 6. YOUNGSTOWN, O.

Blast Furnaces, Steel Plants, Boilers, Tanks, etc.

H. B. LUSCH,
DEALER IN
Commercial Paper.
88 Washington St.,
CHICAGO.

FOR ARTISTIC PRINTING WRITE THE CLEVELAND PRINTING & PUBLISHING CO., CLEVELAND, O.

Stilwell's Patent
Lime Extracting
Heater
AND
Filter
COMBINED.

Is the only lime extracting Heater that will prevent scale in steam boilers. Removing all impurities from the water before it enters the boiler.

Thoroughly Tested.
Over 8,000 of them in daily use.

The Stilwell-Bierce & Smith-Vaile Co.,
Dayton, Ohio.

Our specialty is the building of low priced, labor-saving appliances to handle any material, in any form, from one point to another, at the lowest possible cost. We cover this field.

Write us. Catalogue "C" on application.

THE AULTMAN COMPANY,
908 South Market Street,
CANTON, OHIO, U.S.A.

12 Standard Types AIR COMPRESSORS with a large number of Special Patterns,

Covering the requirements of every application of compressed air. Each machine equipped with the most improved accessories relating to the economical production of compressed air. Send for new catalogue.

Rock Drills, Stone Channelers. | THE **Ingersoll-Sergeant** Drill CO., Cleveland, New York. | Coal Cutters, The Pohle Air Lift Pumps.

Rockford Bolt Works, Rockford, Ill.

ALL KINDS OF
Bolts, Lag Screws, Rivets, Washers and Odd Bolt Work.

Mention the Iron Trade Review.

THE IRON TRADE REVIEW
Is an increasingly valuable medium through which to sell equipment to machine shops and foundries.

THE IRON MASTERS' LABORATORY, Established 1866.
J. Blodget Britton & Co., Analytical and Consulting Chemists,
Warrenton, Virginia, formerly located 339 Walnut Street, Philadelphia.
Analyses of Iron Ore, Iron, Steel, Coal and Coke, Slag, Limestone, Clay, Fire Brick, Water, etc.

AIR COMPRESSORS

Thoroughly up-to-date and the most simple, durable and economical machines on the market. Built on improved lines.
ROCK DRILLS, AIR LIFT, PUMPS, ETC.
Send for catalogue

RAND DRILL CO.
100 Broadway, New York.
1328 Monadnock Block, Chicago.

O. TEXTOR,
Chemist, Metallurgist and Assayer.
Analyses made of Metals, Ores, Fuels and Supplies for Furnaces, Steel Works and Foundries.
Ores sampled at mines, furnaces and lake ports.
Advice furnished to operators of Blast Furnaces Steel Works and Foundries.
Mining properties reported upon.
158 Superior St. CLEVELAND, O.

AIR COMPRESSORS
For every application of Compressed Air Power.

Complete Catalogue upon application.
Clayton Air Compressor Wks.
26 Cortlandt St., NEW YORK.

CABLE ADDRESS "METALFAC-CHICAGO" A.B.C. CODE
E. H. STROUD & CO.,
METAL FACTORS.
The Products of and Supplies for
IRON · STEEL · TIN-PLATE · BRASS
COPPER · LEAD · & · ZINC · WORKS.
36 La Salle Street & 100 William Street
CHICAGO. NEW YORK.

F. A. EMMERTON,
Analytical Chemist,
AND METALLURGIST.
Ores sampled at lake ports, mines and furnaces.
Mines and Metallurgical Processes examined.
Analyses made of Ores, Metals, Fuels, Railroad and Foundry Supplies, etc.
9 Bratenahl Building, CLEVELAND, O.

Millett's Patent
CORE OVEN.
The best in the world.
MILLETT CORE OVEN CO., Brightwood, Mass.

THE ROBERT W. HUNT & CO.,
Bureau of Inspection, Tests and Consultation.
PITTSBURG: Park Building. CHICAGO: 1137 The Rookery. NEW YORK: 71 Broadway.
Reports on iron and steel processes and plants. Inspection of steel rails, splice bars, railroad cars, wheels, axles, etc. Chemical Laboratory—Analysis of ores, iron, steel, oils, water, etc. Physical Laboratory—Test of metals, drop and pulling test of couplers, draw bars, etc. Efficiency tests of boilers, engines and locomotives.

John T. Jones & Co.,
Mines, Prospects, Explorations and Mineral Lands, examined, experted, practical tests made and reported. Reliable and practical sampling done. Chemical analysis made. All work done by practical expert. Best of reference as to experience and reliability. Address
Suite 32, 115 Monroe St.,
MONTAUK BLOCK, CHICAGO, ILLS.

DICKMAN & MACKENZIE,
CHICAGO,
1224 Rookery Building.
Mining properties examined. Ores sampled at mines, furnaces and all lake ports.
General analyses of Ores, Slags, Metals, Fuel, Foundry Materials and Products, etc.
CHEMISTS AND ENGINEERS.

Subscribe for the Iron Trade Review.

THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. FEBRUARY 2, 1899. CHICAGO, ILL. NUMBER 5

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

A strong situation in every department of the iron market has grown stronger in the past week. Consolidation projects thicken; and while no additions have been made to the completed ones, it is becoming more evident that the centralization movement is likely to cause even a more radical recasting of the lines than has yet taken place. The tin plate consolidation has strengthened its position by arrangements for the output of leading tin plate machinery manufacturers; and if to this is added control of the sources of sheet bar supply through an allied consolidation, on the plan noted in these columns two weeks ago, the industry is insured against any repetition of the demoralization of its early years. A further advance in price, following the upward movement in pig tin puts 100-lb. coke plates at $3 35 to the general trade. The effort for the gathering together of the sheet bar and billet mills of the Central West is being confidently pushed, and that the supply of sheet bars is well under control has been demonstrated by very recent unsuccessful efforts of outside interests to make purchases. The proposed consolidation of sheet mills and the more ambitious plan for bringing under one control the rolling mills whose product is chiefly merchant bars, are being worked upon, and are proving far more difficult of handling than the wire and tinplate propositions. Money is so abundant that the financial end of all the pending deals is much less difficult than the manufacturing end. The rolling mill combine encounters a multiplicity of diverse interests and conditions, which mean long negotiations, if indeed success comes at all. The promoters of the steel works consolidation have their matter well in hand. In the Wheeling district two important plants are included. In the negotiations with these and with New Castle, Sharon, Youngstown, Columbus and Muncie interests, it is understood exceedingly liberal terms have been given by the promoters. The pig iron market of the week has given further proof that the present active furnace capacity of the country is well engaged to the middle of the year. Some calculations based on the wheeling into line of furnaces now idle seem to ignore the very vital factor of ore supply. In both foundry and basic irons, Northern as well as Southern, this will be the determining element, rather than the question of the price at which idle furnaces can profitably go in. It would be well if the promoters of some of the schemes for furnace resuscitation made sure of ores as well as money. In the Chicago district inquiries for 25,000 tons of foundry iron were up, in the past week, in addition to a call for a round lot of basic. It would seem that the pinch on basic materials may be more pronounced before the middle of the year. Foundry iron has advanced still further and at Chicago has reached $12 for No. 2. With foundrymen the immediate problem is to get what has been impossible thus far, a corresponding advance on castings. Billets have drawn away from Bessemer pig iron and for prompt steel $17.25 and upwards, Pittsburg, is paid, while basic billets are almost unobtainable. Rods have practically disappeared as a market commodity. The wire and wire nail consumption of the coming season promise to be prodigious. The plate market is increasingly firm. At Chicago 8,000 tons were sold last week and the plans for vessel-building on the Lakes are still expanding. An index of the whole situation appears in the fact that practically all the Lake Superior iron ore business for 1899 has been done in a single week following the announcement of Bessemer ore prices.

PITTSBURG.

OFFICE OF *The Iron Trade Review and Industrial World.*
705 PUBLICATION BUILDING, Feb. 1.

The local iron trade continues to hold its position, without an abatement of strength in any particular. Steel is firmer, although the mills are now all producing to their utmost capacity. In sheets, both black and galvanized, the feeling is very much stronger, and this strength is due mainly to the very heavy demand, coupled with higher prices for raw materials, although the pending negotiations for a consolidation doubtless has something to do with the very independent position of the mills as regards sales for delivery some time ahead. In all lines producers are behind their customers' desires in the matter of shipments. Railroad rates are absolutely adhered to. The year has opened with production at a rate which will pass all former records, good as many of them have been, while in the matter of prices there can be no comparison, when regard is had to the volume of business. Steel bars are much firmer, and the majority of producers are now quoting 1.10c, being well filled with orders, and the quotation of 1.05c is only occasionally given. The advance in this line represents about $3 a ton in the last two months. The present prices in iron and steel are not the result of any artificial influence, and would be still higher were not influences strenuously exerted to prevent the usual effect of so great expansion of demand in all lines.

PIG IRON.—The Bessemer iron market is without important incident, except that the Pittsburg market has been cleaned up to such an extent that the Valleys have been called upon for material, thus firmly establishing the rate of $11.15, Pittsburg, the valley rate of $10.50 being strictly adhered to. Early last week a sale was made on the basis of $11.05, Pittsburg, but to-day nothing can be done below the regular differential. A moderate tonnage has been booked in the past week by both valley and local furnacemen. In foundry iron the situation is unchanged, but there is a trifle firmer feeling, and it might be difficult to get No. 2 at the lower figure we still quote, $10.60, although at $10.65 there would be no difficulty for ordinary brands. In mill iron the situation is stronger, and very little iron can be had from Pittsburg furnaces. While a sale was recently made at a shade under $10 in this market, such a performance could scarcely be repeated, and we quote the gray forge market at $10, Pittsburg or valley, while in the valley a higher quotation than $10 has been made. We quote:

Bessemer, valley furnace	$10.50
Bessemer, Pittsburg	11.15
No. 1 Foundry	11.10 to 11.30
No. 2 Foundry	10.60 to 10.75
No. 3 Foundry	10.00 to 10.10
Gray Forge, valley furnace	10.00 to 10.15
Gray Forge, Pittsburg	10.00

STEEL BILLETS.—There is less excitement in the steel market this week, owing mainly to the fact that consumers are now well covered and the mills are getting out tonnage at a greater rate, so that there is a trifle less cause for complaint of delayed deliveries. It would take but little of a buying movement to send prices much higher, since there is very little steel available for any nearby deliveries. Last week a shade under $17, Pittsburg, was paid for a small lot, but this week $17, mill, is the very lowest quotation, and for prompt billets all the way to $17.75 is quoted. We note a sale of a moderate lot yesterday at $17.50, delivered Pittsburg, the freight being about 25 cents. For delivery during the second quarter steel might be had close to $17. Wheeling and valley mills are quoting practically the same as Pittsburg. There is no market in sheet bars and wire rods, and none are obtainable.

PLATES.—There is a very firm tone in the plate market, and some producers are practically out of the market. The demand for plates for steel freight cars is very heavy, and there is a very steady consumption. Nothing below 1.40c for plates can now be done. We still quote: Tank, 1 40c to 1.45c, shell, 1.50c; flange, 1.55c; fire-box, 2c and upward.

SHEETS—Owing to the heavy demand sheets for nearby delivery are very firm, and on account of the movement towards a consolidation the makers are refusing to sell any distance ahead. While there are some quotations for No. 28 at below 2c, it is doubtful if an order could be placed under this figure, while 2.05c is freely quoted. No 27 is quoted at 1.95c and is very firm. In galvanized there is even greater firmness than in black sheets, and 80 per cent straight, with the usual freight allowance, is the current quotation.

SPELTER.—The spelter market has advanced materially since last week and is now firm at 5½c, Pittsburg, the New York market being quoted at 5.65c, with St. Louis quoting 5.30c. High grade zinc ore has advanced at Joplin to about $33 in the bin; fancy ores bring $1.50 a ton more.

IRON AND STEEL SKELP.—There is a heavy demand for skelp, the pipe mills being in general busier than at this time for many years. While prices on iron skelp are unchanged, steel skelp has advanced fully a dollar a ton, in line with the advance in steel, and is very firm at the new prices, while a further advance, to make up for the whole advance in steel, may be looked for at any time. We now quote: Grooved iron skelp, 1.10c to 1.15c; sheared iron skelp, 1.25c to 1.27½c; grooved steel skelp, 1 05c to 1.7½c; sheared steel skelp, 1.20c to 1.25c.

RAILS AND TRACK MATERIAL.—There is no important change in the rail market, and from $19 to $20 is quoted. Track material is in good demand, with prices firm but without change since last report. We continue to quote: Spikes, 1.45c; track bolts, 1.65c to 1.70c; splice bars, 1.10c to 1.15c; links and pins are quoted from 1.30c to 1.35c. A sale of 30,000 tons of rails for the Colorado, Texas & Mexico Road has been made in the week by the local mill.

PIPES AND TUBES.—The pipe mills are well filled with orders and some are out of the market. The situation is somewhat unusual for this season of the year. The demand is in the usual run of orders, no special contracts having been placed recently. The movement to consolidate the pipe mills is taking somewhat more definite shape. Unlike the consolidations effected recently, this is a movement within the trade without the help of outside influences or capital. Many such efforts have been made in the past, but no basis could be agreed upon on which to take in the mills, largely because some manufactured pipe from skelp while others manufactured the raw material, so that the tonnage output of pipe furnishes no basis of allotment. A change has been made in the classification of merchant boiler tubes, 2½-inch being included with the smaller instead of the larger size, while the discounts were decreased by 2½ per cent. We now quote: Additional discounts:—Five tens and seven and a half for less than carloads with an extra five for carloads; base discounts:—Butt weld, black, 55 per cent off; lap weld, black, 65 per cent off; butt weld, galvanized, 45 per cent off; lap weld, galvanized, 50 per cent off. Discounts on merchant boiler tubes are as follows: 1¼-inch to 2½-inch inclusive, 70 per cent off; 2¼-inch and larger, 72½ per cent off, with an extra 5 per cent to dealers. Inserted joint casing is quoted at 60 off and screw and socket joint casing at 60 and 10 per cent off, with an extra 2½ per cent to dealers.

STRUCTURAL MATERIAL.—Prices remain unaltered, while there is a fair sized tonnage being placed, with prospects of considerable heavy business as soon as building plans take definite shape. We still quote: Beams and channels, 3 to 15 inches, 1.30c; 18 to 24 inches, 1.40c; tees, 1.35c; zees, 1.30c, and angles 1.20c.

OLD MATERIAL.—There is a fair run of business in this line and we quote former prices, except 25 cents less a ton for wrought iron turnings, as follows: Old steel rails, long lengths, $10.25; cut, $10.50 to $10.75; old iron rails, $14.25; wrought iron scrap, $11.50, net valley; cast borings, $6, net, valley; busheling scrap, $9, net; car wheels, $10.25, gross; cast scrap, $9, gross; iron axles, $6, net; steel axles, $12.50, gross; charcoal scrap, $10, gross; wrought turnings, $6.75, net, valley.

CHICAGO.

OFFICE OF *The Iron Trade Review and Industrial World.*
1522 MONADNOCK BLOCK, Feb. 1.

The situation continues to gain in strength from day to day. In two or three branches of the market advances have been made in the week, and in every branch there is an upward tendency. The demand for nearly all classes of iron and steel is good and in some cases large, and sales last week were fully as large if not larger than were those of the week previous.

PIG IRON.—The week has seen another advance in prices of iron. Quotations on Northern iron are made 50 cents higher than a week ago, on a basis of $12 for No. 2 foundry. Southern irons are selling on a basis of $12 for No. 2 foundry, although many furnaces are entirely out of the market on this as well as on other grades, and other furnaces ask quite a little more than this price for their iron. Southern freight rates are announced to have been advanced 40 cents a ton to $3.50, Birmingham to Chicago, taking effect February 6. The demand for both Northern and Southern iron has been large, inquiries last week aggregating over 25,000 tons, although the furnaces were unable to accept this much business. Good orders were placed, however, local furnaces securing the bulk of the business, and in every case prevailing prices were paid by the buyers. One inquiry of 5,000 tons was received, but has not yet been placed, as the buyer was unable to find any furnace or furnaces able and willing to accept the business for the deliveries required. Within the past week the sale of Iroquois furnace, at South Chicago, from the Iroquois Furnace Co. to a syndicate controlled by Rogers, Brown & Co., was consummated. Quotations on foundry irons are now made as follows:

Lake Sup. Charcoal....	$12 50 @ $13 50	Southern Coke No. 3...	$11 75 @ 12 00
Local Coke Fdy. No. 1	12 50 @ 13 00	Southern No. 1 Soft....	12 50 @ 12 75
Local Coke Fdy. No. 2	12 00 @ 12 50	Southern No. 2 Soft.....	12 00 @ 12 50
Local Coke Fdy. No. 3	11 50 @ 12 00	Sou'hern Silveries.....	12 50 @ 13 00
Local Scotch Fdy. No.1	12 50 @ 13 00	Jackson Co. Silveries..	13 00 @ 13 50
Local Scotch Fdy. No.2	12 00 @ 12 50	Onio Strong Softeners	12 50 @ 13 00
Local Scotch Fdy. No.3	11 50 @ 12 00	Alabama Car Wheel...	15 50 @ 16 50
Southern Coke No. 1...	12 50 @ 12 75	Malleable Bessemer ...	11 50 @ 12 00
Southern Coke No. 2...	12 00 @ 12 50	Coke Bessemer.....	11 50 @ 12 00

BARS.—The demand continues large, and good sales of both iron and steel bars were made last week. Orders included several round lots, one being for 3,500 ons, with several others nearly as large. Mills are very firm in their views, and are getting full prices for their iron. Common iron is quoted at 1.10c to 1.15c; guaranteed at 1.15c to 1.20c; soft steel bars from billet stock, 1.10c to 1.15c.

RAILS AND TRACK SUPPLIES.—Considerable sales were made in this market last week, the local mills securing their share of the business. The demand continues large, and further sales are expected to be made in the immediate future. Quotations are as follows: Standard section rails, $20 to $22; light rails, $20 and upwards; steel splice bars, 1.15c to 1.25c; track bolts with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.55c to 1.60c.

BILLETS AND RODS.—The local mills took no orders last week for either rods or Bessemer billets. Some demand is had for open-hearth billets, and sales were made last week on a basis of $23, Chicago. Quotations on Bessemer billets are nominally $18.50, and on rods, $25.50.

CAR ORDERS.—Orders for car material of all kinds continue to be frequent and large, indicatin a good business for the car works. Outside of one contract for 500 cars, no large orders were placed last week in this market.

STRUCTURAL MATERIAL.—There is an excellent demand for

all kinds of material and sales last week were quite large. There are a number of inquiries in the market for large lots, for building projects, and bridge builders are asking prices on a considerable tonnage. Quotations are as follows: Beams, 15 inch and under, 1.45c to 1.50c; 18 inch and over, 1.55c to 1.60c; angles 1.35c to 1.40c; sheared plates 1.40c to 1.45c; universal plates 1.40c to 1.50c; tees 1.50c to 1.60c; zees 1.40c to 1.45c. Small lots from stock are quoted at ¼c to ½c higher.

PLATES.—Business last week was fully as large as that of the previous week and included several good sized contracts. The local mills took some considerable orders in the week. The total tonnage closed in this market was probably in excess of 8,000 tons. The market is very firm and mills are holding strictly to quotations. Prices are as follows: Tank plates, 1.40c to 1 50c; flange steel, 1.45c to 1.50c; marine, 1.70c to 1.80c; fire box steel, 2.25c to 5c.

SHEETS.—Good orders for both black and galvanized sheets were closed last week, one especially large contract having been closed. The demand continues and appears to be getting larger all the time. Quotations are made at 2c to 2.10c for No. 27 black sheets, and 80 and 5 per cent off for galvanized.

MERCHANT STEEL.—Business last week was very satisfactory, the mills not being in position to accept any very large orders. The demand is large enough to more than take care of any surplus production. Quotations follow: Open-hearth spring tire and machinery steel, 1.65c to 1.75c; smooth finished machinery steel, 1.60c to 1.70c; smooth finished tire, 1.50c to 1.60c; tool steel, 5.50c to 7.50c; specials, 11c and upwards.

SCRAP.—The demand continues to improve, and sales last week were very satisfactory to the dealers. One order for a round lot of old iron rails was closed and some business was done in old car wheels. Dealers' selling prices are as follows:

Old iron rails, gross	$13 00@$13 50	Axles, net	$14 50@$15 00
Old steel rails long, gr.	10 50@ 11 00	Cast borings, net	4 25@ 4 50
Old steel rails, short	8 50@ 9 00	Wrought turnings, net	6 00@ 6 50
Old wheels, gross	11 75@ 12 25	Axle turnings, net	7 00@ 7 25
Railroad forge, net	11 75@ 12 25	Mixed steel, gross	6 50@ 7 00
Dealer's forge, net	9 50@ 10 00	Stove plates, net	5 75@ 6 00
No. 1 mill, net	7 25@ 8 00	Heavy melting steel, gr.	8 25@ 8 50
Heavy cast, net	8 50@ 9 00	Old iron splice b., net	12 75@13 00
Malleable cast, net	8 00@ 8 50		

CLEVELAND.

OFFICE OF *The Iron Trade Review and Industrial World*, 27 VINCENT ST., Feb. 1.

The statement was made in this column a week ago, in connection with the announcement of the quotations for 1899 on old-range Bessemer ores, that large sales might be expected within the ensuing week. The sales have been made, and in volume far exceeding any week's transactions at the opening of an ore season. Buyers came promptly into the market, and in the case of some of the most desirable ores it was a problem with selling firms to adjust the requisitions so that customers who wanted their usual ores could be satisfactorily taken care of. The largest purchases, as heretofore, were made by the Chicago interest, which is not a consumer of Federal Steel Co. ores outside of Mesabis. The result of the week's business is that several sellers of old-range Bessemers are practically out of the market; that the Mesabi ores are quite well taken up and that large sales of non-Bessemers have been made. On the other hand buyers for the most part have secured their year's supply. Business heretofore drawn out over weeks and months has been closed in a week, and any expectation that the pace will be kept up even another week will be disappointed. It is quite too early to make figures as to the relation between the year's consumption and the year's production. While some buyers will not get the ores they started out to buy, adjustments will be made, as heretofore, by which with some change of mixtures consumers will be taken care of. As previously remarked, all the year's product will be needed, at the present rate of consumption, and dock stocks are expected to be drawn upon to a greater extent than before. The estimates of output, on which sellers have been working, in disposing of their product, have been conservative, and there is no disposition to book too heavily and run chances of having to scale down in the latter part of the season. The prices of Mesabi ore show various advances over last year. In the case of Fayal the 1899 price is $2 40. Sparta, which was the highest priced Mesabi ore of last season, leads also this year at $2.45, an advance of 20 cents over 1898. In non-Bessemer ores the advances secured have been from 15 to 20 cents over last year. A Marquette range ore that sold at $1.70 last year is now $1.87. The basis in the main has been $2 for an ore running 62 per cent in iron and 12 in moisture, the higher phosphorus ores bringing a premium in view of the growing scarcity of mill cinder. Among buyers of non-Bessemer ores the past week the leading Pittsburg interest may be named. Eastern furnacemen, it would appear from the week's inquiries, will want quite as large a supply of Lake Superior ores as in 1898, though their imports of Cuban and other ores are expected to be considerably larger. In the Lake Superior region operations are on as large a scale as the supply of labor will permit. The future operators of the Queen mine are not yet decided. A Pittsburg interest is among the parties negotiating. In the case of the Franklin mine on the Mesabi range, it is expected that the option of the Pittsburg & Lake Angeline Co. will be closed and that the mine will be extensively wrought in 1899.

PIG IRON.—Increasing firmness in all grades, but generally without change in prices, is the experience of the week. There is so little foundry iron to sell for the first half of the year that transactions for the next three months are likely to be within rather narrow limits. Northern furnaces would ordinarily appreciate the shutting out of Southern iron, but with the latter barred more effectually by the 40 cent advance in freight, and likely to be scarcer in the middle of the year, when the basic steel plant at Birmingham starts, the chief difficulty of sellers is that they must make explanations instead of sales. Small lot sales by valley and local furnaces are made from week to week, but no large business is done. Bessemer furnaces are making steady shipments on contracts, but new business is of very moderate proportions. The price is still $10.50, valley furnace, although steel has gone quite out of relation to pig iron. We quote:

Bessemer	$11 15	Valley Scotch No. 1	$11 40@$11 65
No. 1 Strong Foundry	$11 25@11 50	Valley Scotch No. 2	10 90@11 15
No. 2 Strong Foundry	10 75@11 00	Gray Forge, valley	10 00
No. 3 Foundry	10 50	Lake Superior Charcoal	11 50@12 00

FINISHED MATERIAL.—More vessel building is talked of, some for delivery late in the coming season and other tonnage for the following year; and it is probable that in other cases where vessel construction had been planned action was deferred on account of the advance of $8 to $10 from the lowest point for plates. Plate contracts are being figured on, but the amount of the advance causes hesitation. We quote 1.40c to 1.50c Pittsburg for tank, and where deliveries can be made 1.60c Cleveland could be secured, but it is only rarely that a mill can take even a small order for prompt delivery. In steel bars 1.10c Pittsburg is generally maintained and 1.15c Cleveland is minimum. Bar iron is firm at 1.05c Cleveland. Black and galvanized sheets are active, but no orders are taken for extended delivery. We quote No. 27 at 2.05c and No. 28 at 2.15c Cleveland. Heavy sheets are very firm, and as between ¼ inch and $\frac{5}{16}$ there is no distinction, anything approaching plate gauge being in urgent demand. Beams and channels are unchanged at 1.40c, and angles at 1.30c, with no special activity. In wire and nails there is good activity, in view of the certainty that prices will be on a stable basis. There are no time contracts, the American Steel & Wire Co. thus keeping the market well in hand. The base price on wire nails, jobbing rate, is $1.50 with $1 and $2 a ton advance respectively to carload and smaller buyers. For smooth wire the base is $1.35 and for galvanized $1.70.

W. A. SUMMER, agent of the industrial locations department of the Chicago Junction Railway Co., 627 Monadnock Block, Chicago, has lately located two important industries on the line of his road. The Briquette Coal Co., which is to manufacture coal briquettes from slack coal and culm by a patent process which, it is claimed, obviates the difficulties encountered in other processes, has selected a location and has a plant in process of erection at the 40th st. tracks of the Chicago Junction Railway Co. At Western ave. and the Illinois Central, on the tracks of the railway, the Cole Mfg. Co. is building a plant for the manufacture of stoves, removing to that location from the company's old factory at 2547 Leo st., Chicago. Mr. Summer is figuring on several other plants to be located on his line, and stands an excellent chance, because of the inducements offered, of securing important manufacturing enterprises.

THE IRON TRADE REVIEW
AND
INDUSTRIAL WORLD.

DEVOTED TO MACHINERY, METAL-WORKING AND FOUNDRY TRADES AND IRON AND STEEL MANUFACTURE.

PUBLISHED EVERY THURSDAY BY
THE IRON TRADE REVIEW CO.,
CLEVELAND, OHIO.

CLEVELAND, 27 VINCENT STREET.
G. H GARDNER, President. A. I. FINDLEY, Editor.

CHICAGO:
1522 MONADNOCK BLOCK.
B. M. GARDNER, Associate Editor and Western Manager.
BOSTON: 16 Herald Bldg.

PITTSBURG:
705 PUBLICATION BUILDING.
B. E. V. LUTY, Manager.
NEW YORK: 203 Broadway.

Subscription (strictly in advance), $3 per annum. Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

FEBRUARY 2, 1899.

FRANKLIN INSTITUTE 75 YEARS OLD.

At least ninety-nine minds out of every hundred remember facts more easily than dates. Our Philadelphia friends are now congratulating the Franklin Institute on having reached its 75th anniversary. It is worth while to think how much of the life of our young republic is covered by these 75 years. Jackson had not yet been elected President. Zachary Taylor was hardly known outside of the army. Lincoln was an awkward stripling. Grant was an infant. Farragut was a junior officer. A long list of celebrities were unborn. So much for political history as it was in 1824. As for scientific advancement, the locomotive and the steamboat were still novelties. Telegraphs, telephones, type-writers, phonographs, and a host of inventions were yet to be. A large part of what we term everyday life was undiscovered, when the Franklin Institute began its work.

Passing to the Central Western section of our country, then thought of as part of the little known "Great West," it is startling to reflect on the difference between the Lake region to-day and the Lake region of 1824. Every man who hunted in the woods or fished along the shore knew some one who had fought under Perry. In every household stories might be heard of the days when Tecumseh's great uprising menaced white supremacy over a large part of the Union. One could not have found a man on either side of the lakes who had not heard of Chauncey and of Sir James Yeo, names as famous then as Schley and Cervera are to-day. The war of 1812 was a recent memory in 1824, and the people who talked of Eckford's troubles in building our men-of-war and of Chauncey's difficulty in finding serviceable crews could not have dreamed of the mighty commerce that now passes along the lakes. All the shot ever fired by Chauncey and Yeo, by Perry and Barclay, by MacDonough and Prevost would be but the minutest fraction of the vast masses of iron ore floated over these peaceful waters.

When the Franklin Institute started on its career, the few people who were actively interested in steam railroads were divided in opinion as to the merits of wood and iron rails. The people who have seen wooden rails are now few and growing fewer. In 1824, a trip beyond the Mississippi was far more inconvenient and perilous than a voyage to the Philippines would be to-day. But the contrasts are endless. Modern life is so rapid, and its changes so innumerable that no single article, no single volume could fitly set forth what the country has done in the last 75 years.

The Franklin Institute can justly claim that it has kept pace with the march of science, and that its own labors are worthy of more praise than they have ever received. The report it has just issued for the year 1898 is a review of resultful practical and educational work, which in itself is an appeal for the larger facilities the management is anxious to provide. President John Birkinbine, reporting on behalf of the board of managers, refers to plans on foot for extending the work of the Institute in the promotion of manufactures and the mechanic arts, and suggests that there is no better way of celebrating its 75th anniversary than by increasing the membership to a number sufficient to free the organization from the constant restrictions put upon its expenditures. It is gratifying to know, in this connection, that progress has been made in securing an endowment, and that this excellent institution that has borne a worthy part in the advancement of industry and science in the United States, is destined to be stronger and more useful with its increase in years.

An Arrangement with Tin Plate Equipment Firms.

It is understood on the best authority that an arrangement for mutual protection has been made between the American Tin Plate Co. and practically all the manufacturers of equipment for tin plate works, from the hot mills to the tin house. Following the organization of all such combinations there are always attempts to build competing plants, frequently by irresponsible parties, with the expectation of selling out to the combination. It is often the case that the work on such plants is carried on part way only. It is usually an awkward question with the manufacturers of equipment which is the more desirable, the business of the combination or that of the "outside" manufacturers, if indeed these ever expect to become manufacturers. It is learned that the American Tin Plate Co., in order to settle the matter, came out boldly and entered into contracts with the machinery and other manufacturers, agreeing to divide its business equitably among them all, in consideration of their refusing to build any machinery for outside parties, thus guaranteeing each a proper share of the business, saving the expense involved in going after it in the usual way, and permitting the manufacture of such equipment as may be required at a smaller cost than otherwise, owing to the regular and steady way in which it will come to the equipment manufacturers.

The agreements entered into include, so far as known, all the manufacturers of both hot and cold mills, picklers, tin house machinery, chill rolls, etc. The basis of the agreement is a simple one, the American Tin Plate Co. purchasing the entire output of the respective manufacturers for a term of five years, ending Jan. 1, 1904. The details as to the manner in which the output is to be regulated are not made public, but it is understood a committee will arrange the matter from time to time on a basis already agreed upon.

FRANK C. ROBERTS & CO., civil engineers, have removed their offices to the Real Estate Trust Bldg., Broad and Chestnut sts., Philadelphia. For some years they have been on the southeast corner of Fourth and Chestnut streets.

CONCENTRATION IN THE MACHINERY TRADE.

TO THE EDITOR:

I have a mild case of la grippe; just bad enough so that your leader of Jan. 12 on "Concentration in Machinery Trade" leads me into a train of thought which makes me disagreeable. There is a difference between manufacturing machinery, and manufacturing gum drops, as "Chordal" would say, and there is also a difference between selling machinery, and selling gum drops.

Commercialism can control the gum drop trade, but until it drops some of its own peculiarities, a prominent one of which is the hiring of "pauper labor," it can not control the machinery trade. A man to sell machinery must understand something besides list prices and discounts, and must know the difference between a quarter of a revolution and a quart of oil. The average machinery salesman is like a phonograph. Interrupt him and he will need to continue his recitation from the exact place of the interruption or else begin all over again and repeat what he has already said. Ask him anything that is not in his lesson and he looks at you with an injured air, and says he will "consult with the manufacturer."

I have before said that "brains cannot be cornered," and this is the key to the situation; and therefore it is *not* a surprise that "the machinery business has maintained for so many years such a numerous and diversified array of individual producers." (The editor will remember that I have "the grip," and forgive me for contradicting him.) If the machinery business ever gets into the socialism of the present, it will be the last to go in, and the very first to take the lead in the individualism of the future. It is inherently individualistic; it is the exact opposite of the gum drop business.

A few standard machines have reached the gum drop stage, and no one is sorry. It leaves the individualistic mechanic all the more time to design something different. There is in Cleveland a machinery manufacturing concern who are competitors of mine in certain lines, but who for all that have my "deepest respect and profoundest consideration." Among the things that they make, and I don't, are telescopes and other similar instruments. How long do you think it will be before the exclusive Chicago agent will control the sale of these? Imagine the same dude that comes around and tries to sell engine lathes and emery wheels, trying to sell some range-finders to Uncle Sam! "These range-finders are the best on the market—bearings accurately ground; flat surfaces scraped to surface plates; automatic feed to spindle; rise and fall rest; weighs one-third more than any other; best friction countershaft; no other range-finder has a friction countershaft included in the price—what's that? I will consult with the manufacturer."

Now, Mr. Editor, wouldn't that jar you? If the time ever comes when there is "an entire divorce of manufacturing and selling" the customer will not be able to get what he wants, and this fact will be the death of the system. The world is generally moving toward perfect individualism, although the car containing the gum drops seems to be sidetracked just at present, somewhere on the socialistic branch road.

SCRUTATOR.

Salisbury Carbonate Iron Co.

An announcement is made elsewhere by the Salisbury Carbonate Iron Co., of 95 Nassau st., New York, concerning the charcoal pig iron which it manufactures especially for gun carriage and other work requiring the greatest strength with a minimum of shrinkage—shipbuilding and engine castings, such as centers for driving wheels, crossheads, boxes, etc. Many of the Government tests which it has passed run as high s 38,000 to 45 000 pounds tensile strength direct from the pig. The company now has three furnaces running on this product. A recent letter to the makers from the Union Iron Works, San Francisco, states that the latter company has used Salisbury carbonate iron in its cylinder and other work requiring strength and ductility, and with very satisfactory results.

Great Northern Becomes a Mesabi Factor.

A Duluth dispatch announces that the Great Northern Railroad Co. has purchased the entire holdings in Minnesota of the Wright-Davis company, of Michigan, with the exception of their pine lands. It therefore now owns the Duluth, Mississippi River & Northern Railroad, the Swan River Logging Co., and the fee of the Mahoning, Longyear and Bennett mines, near Hibbing. The Duluth, Mississippi River & Northern Railroad is built from Swan River, a point on the present Fosston branch of the Great Northern Railway, to a point about 12 miles north of Hibbing. With all the branches there is about 100 miles of standard gauge railroad. The Great Northern Railroad has been carrying this company's ore to the Allouez Bay ore dock under a traffic contract. It now becomes the third strong railroad factor in the Mesabi range problem.

End of Cut Rates on Iron and Steel.

All cut rates have been withdrawn by the railroads on iron and steel. The freight rate from the Valleys to Pittsburg, nominally 65 cents, which was until but recently openly cut to 55 cents and quietly as low as 45 cents, is now strictly 65 cents. The Southern railroads, as noted last week, have advanced rates, besides withdrawing cuts, and the rate from Alabama to Pittsburg on pig iron is now $4.10, which is an advance of the card rate formerly existing of 40 cents, while the rate of $3.70 was ordinarily cut during the past year. Previous to the inauguration of the $3.70 card rate, a rate of $4.10 had been in force. Southern foundry iron is now shut out of the Pittsburg market by nearly $2 a ton, owing to the heavy demand on the Southern furnaces and the stiffness in railroad rates.

Tin Plate and Stamped Ware Incorporations.

The United States Tin Plate Co. and the National Tin Plate Co have each been incorporated in New Jersey with $125,000 capital stock by D G. Reid, W. B. Leeds and James B. Dill, president, first vice-president and counsel respectively of the American Tin Plate Co. The companies were incorporated merely to protect the names, just as the former American Tin Plate Co. some years ago incorporated the Elwood Tin Plate Co. to protect that name, the company's works and general office being located in Elwood, Ind.

The National Tin Plate & Stamped Ware Co. has been incorporated in New Jersey by D. G. Reid, W. B. Leeds and James B. Dill, with $20,000,000 authorized capital stock, half common and half preferred, the latter drawing 7 per cent cumulative dividends.

The National Enameling & Stamping Co., incorporated under New Jersey laws last week, with a capital of $30 000,000, included granite ware and other interests in New York, Baltimore and St. Louis and Milwaukee. As a feeder to the latter the St. Louis Tin Plate Co. was organized under New Jersey laws Jan. 27 to acquire the tin plate works of the St. Louis Stamping Co., at Granite City, Ill. A New York dispatch of Jan. 31 says that the two stamping works named above—the National Tin Plate & Stamped Ware Co. and the National Enameling & Stamping Co., though organized as competitors, are to be amalgamated and in the amalgamation will be included the St. Louis Tin Plate Co. This would indicate co-operation, rather than competition, with the American Tin Plate Co.

L. M. BOWERS, of the Bessemer Steamship Co. (Rockefeller fleet) has asked for bids on three more freight carriers of the largest type—a steamer and two barges. The steamer is to be a duplicate of the Morse, the largest vessel on the lakes, and the barges are to be of the 8,000-net-ton type, similar to the barges Fritz and Roebling, built recently at West Bay City. If contracts are let for these three vessels, the Bessemer company will have five freight carriers of the largest type building in lake yards. A duplicate of the Morse is now under construction at the Globe yard, Cleveland, and a duplicate of the barge Roebling at the works of the American Steel Barge Co., West Superior. The vessels now proposed are not to be delivered until the spring of 1900, as there is no yard on the lakes that can make earlier delivery. The Cleveland Ship Building Co., Globe Iron Works Co. and American Steel Barge Co. are bidding on the vessels, but the other yards have not been consulted in the matter. Steel for ship construction has advanced to about $29 a ton, against a price of $22 a ton only a short time ago. This condition, due to activity in ship yards all over the country as well as on the lakes, and due also to more foreign orders for ship plate booked by the mills recently, may interfere with these contracts, but it is not thought that the management of the Bessemer company would again take up the question of new ships, especially for delivery in 1900, if they were not quite well settled on the policy of going ahead with the construction of more new tonnage.—[Marine Review.

AMERICAN COMPETITION IN THE GERMAN IRON MARKET.

BY JACOB MUENCH.

On account of the recent increase of American exports of iron and steel, and the reports in several English papers, that "all the German iron and steel manufacturers are willing to combine for the purpose of taking measures against the heavy American competition," it may be of some interest to readers of *The Iron Trade Review* to know something of the German iron interests, which competition from this side is thus affecting, and of the lines on which combinations now exist. In speaking of the German iron industry it is necessary to understand something of its geographical status and its division into groups, and how it is to be competed with as a whole or in sections.

While the German empire, or as we may better say, in this relation, the German Customs Union, consists of 27 different states, including the grand dukedom of Luxemburg, there are only five regions, generally speaking, which can be regarded as iron and steel producers. But all these five regions are not fitted out by nature on an equally generous scale. Some of them have only the coal; some have only the ore and others have both ore and coal together. There has always existed a lively competition among these five regions in securing markets for their heavy production. Each has its natural market, and others selling in that territory have to make sacrifices. In the German empire, transportation depends very largely on the railroads, and as the railroads belong to the different states, there is no freight competition, but a firm tariff—so much per ton and kilometer. The shipper of 100,000 tons has to pay the same rate as the one who ships only 10 tons.

In the course of increasing production and sharper competition, the manufacturers concerned discovered the folly of wasting their money, all for the benefit of the consumers who need to buy what they want, without strict reference to price; and so the producers agreed to hold prices on a fair scale and to confine their operations, each to his natural market territory. In the furtherance of this plan, there were formed five groups, as follows:

1. The Southwest German group, which consists of the blast furnaces and rolling mills in Luxemburg, German Lorraine, Southern Rhineland (the so-called Saar region) and Rhinepfalz.

2. The Rhenish-Westphalian group (Ruhr region), consists of the blast furnaces and rolling mills in the Prussian provinces of Rhineland (apart from those in the Saar region), Westphalia and Western Hanover (Osnabrück.)

3. The Siegerland-Nassovian group, the smallest of all, consists of the works in the Prussian province of Hessen-Nassau and dependencies.

4. The Middle German group consists of the works in eastern and southern Hanover, Saxony and Bavaria.

5. The Silesian group consists of the works in the Prussian province of Silesia.

Groups 1 and 2 are the most important. At present No. 2 is in the lead, but in a few years it will be compelled to give place to No. 1, because the center of the German iron industry is steadily moving from the Ruhr region to the Saar region. This movement can only be arrested when the proposed Rhine-Weser-Elbe Canal (called Midland canal) is built, and the canalization of the river Moselle is accomplished. Group 3 does not enter into the present consideration.

Groups 4 and 5 have had to stand sharp competition from the other groups, though they are best situated for their so-called home market, and just that competition led to the agreement above mentioned. The effect of this agreement was indeed wonderful, because, the Russo-German commercial treaty being concluded at about the same time, there was then no real obstacle to the natural overflow of the German production of iron and iron products. Subsequently the German iron production increased from about 4,000,000 tons in 1892 to about 7,000,000 tons in 1897. The manufacturers and workmen came to understand the value of the agreements in force, and the iron consuming works found it easy to take contracts for long deliveries, because they knew they could figure on firm prices for a long time. At the outset, when the agreement was made and prices fixed, there was the familiar outcry about trusts, about the draining of the resources of the people, and more in that line; but now after many years of "trust operations" everybody connected with the iron and steel industry is pleased with the existing conditions.

Besides the five groups named above, there are established for the sale and distribution of the products, the Gray Forge Sales Association, of German Lorraine and Luxemburg; the same for Thomas, or basic, iron; an association for the sale of foundry iron of Lorraine-Luxemburg, in Luxemburg; the South German Beams Sales Association, in Saarbruecken; the Rhenish-Westphalian Foundry Iron Sales Office, in Duesseldorf; the West German and Middle German Rolling Mills Associations and several other associations and unions, especially for the sale of merchant iron and iron goods.

Possibilities of Foreign Competition.

Now comes the question: In the face of a production of 7,000,000 tons, in a territory about equal to that of the States of New York, Pennsylvania, Ohio and the Virginias together, is there any large market for foreign producers? And here comes in the fact that the German iron industry depends on foreign countries, not only in connection with its pig iron product iron, but also for the consumption of its iron in foundries and other plants, and for the sale of a certain part of its manufactures. Perhaps, to speak more accurately, it does not depend on these outside countries; but it does buy raw materials abroad, manufactures them and sends the products to other countries. There are imported, for example, great quantities every year, of iron ores from North Africa, Spain, Greece, the Caucasus and Sweden (from the last named about 1,000,000 tons a year), while the rich ore deposits in Nassovia and South Germany (Odenwald) are kept in reserve for the future. Only recently a lot of 75,000 tons of Newfoundland iron ore was sold to a German blast furnace company and delivery is under way.

Then there are imported yearly about 500,000 tons of pig iron from Great Britain, Spain and the United States. But the reason of these imports is not that German furnaces cannot make the same quality; but as foundrymen know, nearly every one in that trade has his own particular idea of mixtures, and therefore as soon as a new brand comes into the market it is experimented with. Further, it is often cheaper to take foreign iron for export orders, on account of the saving of duty. If the foreign iron, under survey of custom house officials, is mixed and melted with domestic iron, and the resulting product exported, then the duty is rebated.

The export of manufactured iron, machines, hardware, etc., has been a life study of German iron manufacturers. There is not any piece of iron mongery in the trade which a German works could not make. It may be the coffin nail mentioned by Charles Dickens, or the most complicated piece of machinery.

Another advantage of the German ironmaster is that the imported iron ore is free of duty, while the duty on pig iron is $2.40 per metrical ton (and free of duty where re-exported in finished form, as noted above); and on finished iron, as rails, beams, rods, angles, plates, sheets, pipes, there is a duty of $6 a metrical ton. It is evident that pig iron is very seldom imported across the German frontier and finished iron never, except for ship-building; then it is free of duty. It may be stated here that the German iron works are equipped with most of the modern improvements, while the capacity is generally in modest limits. The fact is easily explained by local conditions, that the Reiner Walzwerk, for instance, a rolling mill near Hanover city, is able to produce rails, rods, beams and angles for less than $15 per metrical ton, while the Halberger Huette, near Saarbruecken, produces cast water and gas pipes for about the same price.

In production of pig iron the Roechling Iron & Steel Works in Voelklingen on the Saar lead all, with a cost of about $4.25 per metrical ton of pig iron. They are enabled to do this by the possession of their own coal and ore mines and by blast furnaces of large capacity. Their fourth furnace has a capacity of 500 tons a day and one is now building which is expected to produce 1,000 tons a day. It can be understood that for such a concern the much discussed American competition cannot be serious.

[Concluded in next issue.]

AMERICAN TIN PLATE CO.'S SALES POLICY.

The organization of the more important departments of the American Tin Plate Co. is now nearly completed. The sales department was, of course, the first one which had to be attended to, and the work has been made more difficult on several accounts. The former owners of the plants sold mainly through large dealers, while the American Tin Plate Co. is doing the selling itself to carload buyers and larger, entailing a great amount of work. There will be an Eastern office, as already mentioned, with Frank Dickerson in charge, and a Pacific Coast office, with W. H. Wells in charge. Mr. Wells just reached the Coast in the past few days. To add to the difficulties in organizing the sales department, there was the accumulation of mail at the individual works during the period in which the ownership was changing hands. This was forwarded in bulk to the Chicago office for attention, and the demand for tin plate has been something very unusual for this time of year. The rapid advances in pig tin have required several changes to be made in the selling price, and to show how the company is prepared to meet conditions, its action in this connection is cited. One of the first rules laid down was that common ternes should sell at exactly the same price as coke tins. Owing, however, to the late rapid advances in tin it was seen that this would not be a fair rule, because a box of coke plates requires two and a half pounds or more of tin to make, while common ternes contain only about a pound of tin per box, although the total weight of coating, including the lead, may be four pounds or more. The original rule of selling common ternes and coke plates at the same price has therefore been dropped, and the former are now being sold at 15 cents a box less than the latter. C. M. Stuart took active charge of the sales department early last week. W. T. Graham, second vice-president, has general supervision of the department. Mr. Stuart was formerly secretary of the Morewood Co., Gas City, Ind., and was closely identified with the Welsh tin plate trade before he and his associates built the mill at Gas City. John F. Hazen, who was vice-president of the former American Tin Plate Co., is in charge of the credit department. Instead of having a general purchasing agent, whose powers in such large corporations are frequently undesirably great, the large purchases of the company will be made directly by the executive committee of five, composed of the highest officials in the corporation—a policy which will be satisfactory to the stockholders and to those who have material to sell.

In view of the further advance in tin and in steel, notices were sent from Chicago on Jan. 28 of an advance from $3.10 to $3.35 a box of 100 pounds, for coke tins.

The Advance in Tin.

The continued rise in the price of tin, which is now selling at nearly eight cents a pound above the average quotations of January, 1897, appears to be in large part the result of a well managed speculative movement. There have been some elements which would naturally cause an increase in price, and a moderate advance was to be expected. The consumption for the past year has been somewhat greater than the production, and at the same time there has been some rise in wages in the chief producing districts—the Malay Peninsula and the Dutch East Indies. This rise was partly due to the demand for miners and partly to the short rice crops in India, an important point, since the great majority of the miners are Chinese, and rely chiefly on rice for their support. The course of silver, on the other hand, had very little effect on the price of tin last year, since its fluctuations were small.

On this basis and on that of the small visible supply, which on January first was only 20,131 tons, parties in London and Amsterdam have taken hold of the market and have forced up prices to a point unknown for years. Their profits have been large, and they may be able to keep up the quotations for some time yet. It must be remembered, however, that tin is derived chiefly from alluvial workings, and in the Straits—and to some extent in Sumatra, also—the output can be rapidly increased from known deposits with only a small expenditure of capital. Twenty or 22 cent tin will be a great incentive to larger production, and new supplies will have a tendency to bring prices down again to a normal level. For a time, however, the speculators have matters their own way. —[Engineering and Mining Journal.

PERSONAL.

President, Joseph Forker; vice-president, John Phillips; secretary, M. H. Henderson, New Castle, Pa ; treasurer and general manager, J. J. Spearman, Sharon, are the officers elected by the Spearman Iron Co., Sharon, Pa., last week.

Benedict Crowell, metallurgical engineer, of Cleveland, has returned from a trip to Trinity County, Cal., for the examination of placer deposits.

The directors elected Jan. 28 by the stockholders of the Bellaire Steel Co. were: John A. Gallagher, Frederick Seabright and James Wilson, of Bellaire; A. B. Carter and J. R. McCourtney, Wheeling, and Earl W. Oglebay, of Cleveland.

Andrew Carnegie has offered the Pennsylvania State College $100,000 for a library building, providing that the State appropriate $10,000 annually for its maintenance. An act has been drafted to comply with these conditions, and will be presented in the Legislature this week.

William Durham Sargent is to be married on Tuesday, Feb. 14, to May Alene, daughter of Mr. and Mrs. Charles W. Pardridge, 3,200 Michigan ave., Chicago. Mr. Sargent is the general manager of the Sargent Co., Chicago, and is well known as the inventor of several valuable designs of brake shoes.

John Birkinbine was re-elected president of the Franklin Institute of Philadelphia at the recent annual meeting.

J. S. Paaske, a mechanical engineer of Hamburg, Germany, and the European agent of Markt & Co., Ltd., exporters of manufacturers' goods, of New York, has been in Pittsburg visiting the Westinghouse works at Wilmerding and East Pittsburg, and the Carnegie and other steel works. He may become the agent for American-made electric motors and other electric equipment.

Thos. Wathey, formerly with the Walker Co., Cleveland, has gone to Clifton, Ariz., to superintend the building of a foundry of which he will have charge. The foundry is erected by the Arizona Copper Co., miners and smelters. Its works are quite extensive, and as the company owns 125 miles of railroad, 12 locomotives and 200 cars, there will be plenty of business for the foundry.

Alfred C. Cass, a vice-president of the Colorado Fuel & Iron Co., will soon sail for Honolulu, Japan and China to study the possibilities of export business in the Orient. The establishment of a line of steamers by the Atchison, Topeka & Santa Fé interests from San Diego to Asiatic points will facilitate the effort for this trade.

Rogers, Brown and Co. Buy Iroquois Furnace.

Negotiations in progress for some time for the purchase of Iroquois Furnace, South Chicago, by Rogers, Brown & Co., have been concluded. The well known selling company, which now has important interests in the Tonawanda, N. Y., and Punxsutawney, Pa., furnaces, has taken over the Iroquois furnace plant, real estate, ores and other stock and equipment, but does not acquire the stock of the Iroquois Furnace Co. William A. Rogers, head of the firm, is president of the furnace companies operating the Tonawanda and Punxsutawney stacks. The Iroquois plant is modern in equipment. It was built in 1890-91 and started in the fall of 1891. It was relined in the latter part of last year. Its product has been foundry iron, for the most part, its annual capacity being 75,000 gross tons. The officers of the Iroquois Furnace Co. are Hay Walker, Jr., president, and T. H. Given, treasurer, Pittsburg; Chas. F. Forster, secretary and general manager, Chicago; Jerome Zink, superintendent, South Chicago. The selling agents have been Forster, Waterbury & Co.

Buffalo set out two weeks ago to raise $500,000 for the Pan-American Exposition of 1901. By Saturday, Jan. 28, the amount subscribed had reached $1,200,000. The purpose is to make this one of the greatest of the expositions that have come in the wake of the World's Fair.

The Colorado Fuel & Iron Co. opened a branch office in New York City, Feb. 1, placing Robert F. Welborn in charge. H. C. Harmon will succeed Mr. Welborn as assistant general sales agent of the company, and Thomas Ryan will succeed Mr. Harmon in charge of the retail department.

AMERICAN STEEL AND WIRE CO. OFFICERS.

The new directors of the American Steel & Wire Co., elected in New York, Jan. 24, as noted last week, met on Jan. 25 and elected officers. The officers of the old company predominate in the new list. From the outside interests acquired P. W. Moen and Charles T. Boynton, of the Washburn & Moen Co., were made directors and given office as indicated below, and G. T. Oliver, of the Oliver Wire Co., of Pittsburg, was also made a director. Henry Seligman and Frederick Strauss, from J. & W. Seligman & Co., the financial agents of the deal, were placed on the board. The officers selected are as follows:

J. W. Gates, chairman of the board; John Lambert, president; William Edenborn, first vice-president; J. L. Ellwood, second vice-president; S. H. Chisholm, third vice-president; P. W. Moen, fourth vice-president; W. A. Green, treasurer; F. L. Watson, assistant treasurer, Chicago; T. P. Alder, assistant treasurer, New York; C. S. Roberts, secretary; O. Owen, assistant secretary, Chicago; F. E. Patterson, assistant secretary, New York.

Executive committee—I. L. Ellwood, chairman; J. W. Gates and William Edenborn.

William P. Palmer, general manager; A. M. Crane, assistant general manager; C. T. Boynton, general sales agent; C. A. Honecker, auditor; C. A. Vogt, assistant auditor.

Chairman John W. Gates.

John Warne Gates, who was elected chairman of the new American Steel & Wire Co. at New York Jan. 25, was born in Du Page County, Ill., May 18, 1855. He graduated at Northwestern College, Naperville, Ill., in 1873. He was in the grain business for a time, and then in hardware, and later became connected with the wire trade. This is the line of iron manufacture to which he has given most attention for nearly 20 years. The firm name was J. W. Gates & Co. In 1881 he organized the Southern Wire Co., of which he was president. The Braddock Wire Co., of Pittsburg, was organized by Mr. Gates and associates in 1884. They then acquired successively an interest in the Iowa Barbed Wire Co., of Allentown, Pa.; St. Louis Wire Mill and Baker Wire Co., of Lockport, Ill., and merged them all, in December, 1892, into a new company called the Consolidated Steel & Wire Co., with a paid in capital stock of $4,000,000. In this transition stage he helped promote and was the first president of the Columbia Wire Co., which was the product of the long and bitter litigation over wire patents. This company brought the whole struggle to an amicable end by buying every wire patent of value extant, and licensing the contestants, who were its stockholders. Mr. Gates resigned the general managership of the Consolidated Steel & Wire Co. in April, 1895, although still retaining his financial interests therein, and became president of the Illinois Steel Co., paid in capital, $18,635,000, succeeding Jay C. Morse. The wire company continued to expand, and in April, 1898, consolidated with five other companies as the American Steel & Wire Co., capital stock $24,000,000. Mr. Gates was chosen as chairman of the new concern, although retaining the presidency of the Illinois Steel Co. On Jan. 1, 1899, he resigned the presidency of the Illinois Steel Co. A short time previous a still further expansion of the American Steel & Wire Co. had been projected. It was consummated, with the result that practically the entire wire industry of the United States, embracing the manufacturers of wire nails, barbed wire, woven wire feucing, plain wire of all descriptions, etc., was placed under the management of the American Steel & Wire Co., and Mr. Gates was again chosen as its chairman, this being the highest office in the company. The capital of the new concern is $90,000,000, and it is an actual consolidation. Its official life dates from Jan. 1, 1899.

Mr. Gates is a colonel on the staff of the Governor of Illinois, a member of Chicago, Washington Park and Calumet Clubs, of Chicago; Duquesne Club, of Pittsburg; Manhattan Club, of New York. He is an active Republican and has been chairman of the Republican State Committee of Missouri, managing the Republican campaign in St. Louis in 1888. Mr. Gates was married Feb. 25, 1874, to Miss Dellora R. Baker, of St. Charles, Ill. They have one child, Charles G. Gates, junior partner of the firm of Baldwin, Gurney & Co., of the Chicago Board of Trade.

Some Figuring on Earnings.

Statements concerning the prospects of the year for American Steel & Wire Co. earnings are printed in financial and Wall Street columns. A director calls attention to the fact that the earnings of the companies included in the consolidation, last year, under competition, amounted to over $4,000,000 net, and this after paying about $400,000 to $500,000 on interest account for money borrowed, etc. The new company will not borrow, but will have cash in bank and hence the earnings may really be stated for last year at $4,500,000. During the coming year the officers expect that the profits will be at least $7,000,000 net. This estimate is based on the prices that the company is receiving to-day. The company has no bonds on its properties, except about $700,000, and arrangements will be made to take these up shortly. One item of the saving now possible is about $500,000 spent last year in keeping 100 traveling men in the field. Another estimate of possible earnings in the year is based on an output of from 1,000,000 to 1,200,000 tons of finished material and a profit of $8 to $9 a ton.

Iron Trade Consolidation.

The movement for the amalgamation of the wrought pipe manufacturing interests of the country, which has been making headway for some weeks, is thought to be nearly consummated. A meeting is being held in New York this week attended by representatives of the various companies. The American Tube Co. is the name proposed and the capital will probably be $50,000,000 in common and preferred stock. The interests represented in the National Tube Works Co. are prominent in the movement.

The report that efforts are making for a consolidation of cast iron pipe companies is confirmed. It is reported that the Chattanooga Foundry & Pipe Co. interest in the American Pipe & Foundry Co., which takes in five Southern plants, will be separated from the others, owing to a disagreement. Meantime a New York movement is on foot for a larger company that shall acquire the principal pipe works of the company. Franklin D. Locke, of Buffalo, is credited with promoting the project among the Eastern pipe foundries. Joseph S. Auerbach, of New York City, is associated with him. The American Iron Pipe Co. is the name talked of and the capital proposed is $30,000,000.

The Virginia Iron, Coal & Coke Co. has been incoporrated, with capital stock of $10,000,000, by M. D. C. Chapman, E. R. Chapman and C. L. Eichs, of New York City; B. L. Dulaney, of Bristol, Tenn.; G. L. Carter and John H. Shuff. Its object, as noted in these columns heretofore, is to acquire furnace, ore and coal properties in Virginia on the line of the Norfolk & Western Railroad. It is said that the undertaking has been underwritten. Moore & Schley, of New York, are the promoters. The company has a capital of $10,000,000 of stock and $10,000,000 5 per cent bonds, of which $7,500,000 of each is to be issued, the balance to remain in the treasury. Of this $4,000,000 of bonds and $4,000,000 of stock is to be used in the purchase of properties, in commissions, expenses, etc.

Review of the Technical Press.

Translation, Condensation and Comment expressly for The Iron Trade Review by Dr. Richard Moldenke]

Cast Iron in Railway Practice. [*American Engineer and Railway Journal*, Jan., 1899.]—Messrs. Henderson and Walley, of the N. & W. Ry., discuss this subject in connection with the recent thremal tests of car wheels. The claim made that for ordinary railway car construction castings made from melted scrap and costing but three-quarters a cent a pound will answer their purpose very well and give no grounds for complaint. This is hardly borne out by the facts of the case, for the modern tendency is to discard gray iron castings in favor of malleable, the latter being lighter and stronger. For locomotives, however, where solidity is an object and sufficient strength is obtainable by the plentiful use of steel scrap, cast iron finds its place readily for cylinders, valves, driving wheel centers, etc. The conditions under which car wheels enter service are now so severe that close attention must be given to details in mixing the charges and in the casting itself. Not only is there a service guarantee, but the wheels are subjected to drop and thermal tests. The latter is supposed to bring out the real qualification of the wheels to stand service conditions, for the requirements are immunity from rapid wear, shock resisting qualities or, in other words, a good resilience, and the ability to withstand the rim strains due to the heating produced by sudden and heavy braking. In fixing upon the proper composition to—as oddly stated—pass the thermal and drop tests (one would expect to see—to make good wheels), manganese is found very valuable. It, however, reduces the wearing qualities by reducing the chill. In order to get some idea as to the chemical composition of the wheels which would be most likely to be serviceable, a series of about 70 wheels which had failed in service or under tests, and *per contra*, which were very good in service and under tests, were analyzed. The results are given in a table which may be summarized as follows, the samples being taken from the plate: Good wheels contain large amounts of graphite. Silicon is not prominent in any special effect for good or bad. Manganese helps the wheels to pass the thermal and the drop tests. Sulphur and phosphorus are only objectionable when in excessive quantities. Next come the limits in composition on the part of good wheels. Graphite runs from 2.56 to 3.10 per cent, combined carbon from 0.66 to 1.01 per cent, silicon from 0 58 to 0.68 per cent, manganese from 0.15 to 0.27 per cent sulphur from 0.05 to 0.08 per cent, which seems high, and phosphorus from 0.25 to 0.45 per cent. A desirable wheel analysis is given as graphite 2.75 to 3.00 per cent, combined carbon .50 to .75 per cent, manganese .30 to .50 per cent, silicon .50 to .70 per cent, sulphur .05 to .07 per cent, phosphorus .35 to 45 per cent The question of the proper pig irons to use is now taken up, analyses and tests of 27 samples of charcoal iron being given. One fails to note the mention of any coke irons in the paper, though they are now used considerably in making good car wheels, if reports be true. After discussing points in cupola practice, well known to every founder, and therefore here omitted, the final mention is made of the desirability to have at least 0.25 per cent manganese present. To be certain that this is the case ferro-manganese is now usually added to the ladle and, it is said, with very satisfactory results.

Bessemerizing with Warm Blast. [*Stahl und Eisen*, Jan. 1.]—In the Annals of the Swedish Jernkontor No. 5, 1898, Prof. J. Wiborgh advocates the use of warm blast in the Bessemer process. But few trials have been made in this direction during the 30 years that this process has been in general use. The advantage thus obtained in the blast furnace is so obvious that one wonders why warm blast has not been applied in other branches of metallurgy. Since in Bessemerizing, the process amounts to a burning of the silicon, manganese, phosphorus, etc., in the air, would not this combustion be facilitated by using the air warm? Experience has shown that a heat is always hotter in summer than in winter, part of this increase in temperature falling to the air used. If now with a difference of about 90 degrees F. between summer and winter distinct results can be detected, how much greater would be the gain were the difference 700 to 900 degrees F.? In such a case an iron lower in silicon could be used, the tuyeres would last longer, and less iron is wasted. The special advantage of warm blast would be for small converters and for the basic Bessemer process. In the latter a pig iron running lower in phosphorus than is now necessary could be used to advantage and leave the metal sufficiently hot at the end of the blow. Trials made some time ago in Styria seemed to indicate that the lining suffered somewhat more when warm blast was used, but this should not be the case in the basic process; on the contrary, the lower the silicon contents can be pushed the longer this should last. On the score of cost of plant it can be said that the stoves which would be used for regeneration can be much smaller than they are at the blast furnace. Prof. Wiborgh gives the following reasons for this: In heating the air for Bessemerizing the amount of air used per minute is large; but, on the other hand, the time of the blow is short. Thus if the blowing of eight tons of steel with air at 725 degrees F. demands 300,000 H. U. from the stove, the same temperature of blast as furnished by the regulation stove now in use with one reversal an hour would require 1,500,000 H. U., or, in other words, the Bessemer stove could be one-fifth the size of that for the blast furnace Again in the blast furnace it is essential to have the wind heated uniformly. It would not do to have the temperature of the stove drop very much as the stove got cooler. The dimensions of these stoves must therefore be very large, otherwise the results in the blast furnace will be disagreeble. In the Bessemer process this is different. A high initial heat is an advantage in case of a tendency to chill or of abnormally low silicon and maganese contents. At the end of the process it would not matter so much if the blast temperature were lowered. Lastly, the comparatively high pressure of the blast for Bessemerizing would mean smaller volumes of air to be taken care of, which means smaller apparatus. Prof. Wiborgh now gives a calculation of the dimensions of a Bessemer stove in detail, showing finally that the addition of 800 degrees F. means something very appreciable. Thus Prof. Ledebor has found that one per cent silicon in pig iron in burning out raises the temperature of the bath 540 degrees and phosphorus 330 degrees F. Consequently the warming of the blast to 800 degrees above the atmosphere would correspond to a silicon contents of 0.5 per cent, or phosphorus 0.75 per cent, which could be saved. Again with a blast the temperature of which can be regulated there would be an additional safeguard and cold or overheated steel need not be made.

British Shipbuilding in 1898.

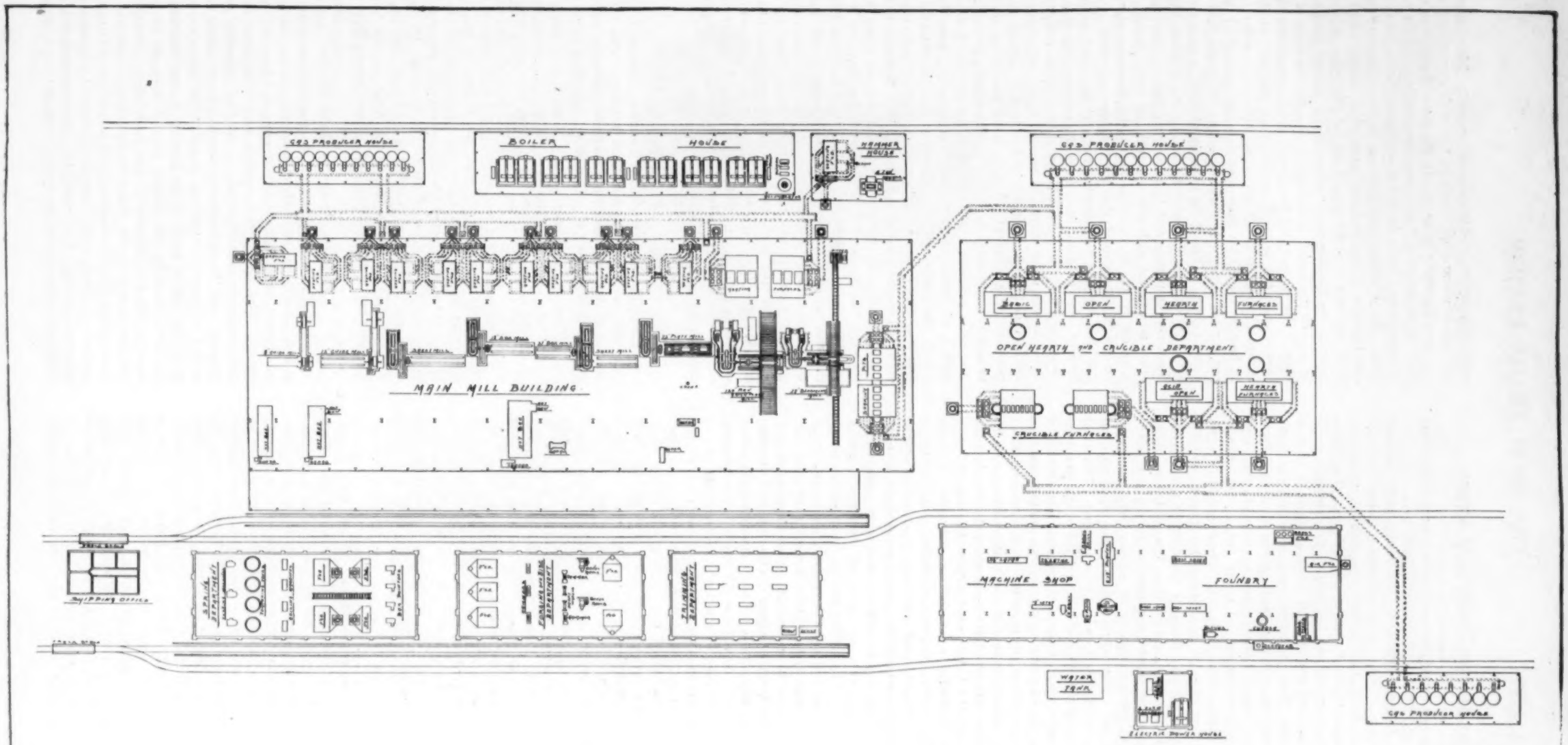
In the shipbuilding trade, the London *Economist* says, the year 1898 was one of unparalleled activity. The total production of the year is estimated at 1,610,000 tons, which compares with the output of immediately preceding years thus:

Year.	Tons.	Year.	Tons.
1898	1,610,000	1895	1,074,900
1897	1,095,900	1894	1,080,400
1896	1,316,900	1893	878,600

The increase of this year as compared with last is no less than 514,100 tons, or 47 per cent, but it has to be borne in mind that the engineers' strike not only restricted the output in 1897, but also projected into the present year arrears of work, to overtake which great efforts had to be made. Of the year's output, 466,832 tons are credited to the Clyde district, 307,300 tons to the Tyne, 262,800 tons to the Wear, 279,000 tons to all the other northeastern ports, and 121,400 tons to Belfast.

Electric Power at Coke Works.

A plant of 120 coke ovens, all the mechanical arrangements of which are to be actuated by electricity, is on the point of completion, to be started early in 1899, at Orlau, in Austrian Silesia. The generating station comprises four 200 h. p. steam engines, each of which is coupled directly with its dynamo; and the three-phase current of 330 volts is transmitted to the electric motors, of which the following are the principal—one of 200 h. p. for driving a coal-washing plant, capable of turning out yearly 225,000 tons; an 80 h. p. for working the gas exhausters; a 30 h. p. for the pusher, or discharger; a 60 h. p. for the wire tramway; a second of the same power for the traverser, and others for driving several pumps—all these in addition to the current required for the electric lighting. The work has been carried out for the Gebrüder Gutmann by the firm of Ganz & Co., of Budapest.



Plan of the New Plant of the Burgess Steel & Iron Works, Portsmouth, Ohio.

Burgess Steel & Iron Works.

The new plant of the Burgess Steel & Iron Works, of Portsmouth, O., now under construction, besides being thoroughly modern, will be much more extensive than the works destroyed by fire last year. A new site was chosen about three miles from the city, where plenty of room could be had, and the new steel works settlement will be known as Yorktown, taking the name of the president of the Burgess company, Mr. L D. York. Going beyond its original plans, the company now announces that it will build a 300-ton blast furnace, and will thus be independent of the market for its pig iron supply. Drawings are now being made and the furnace work will begin at an early day. The old steel plant and rolling mills were burned on June 7, 1898. Work on the new plant was begun about the middle of August. It is the expectation that two open-hearth furnaces and the plate and the bar mills will be in operation by March 1 and that the entire steel plant will be running by July 15.

The extensive scale of the re-constructed plant is indicated by the accompanying plan and from the following general statement of dimensions: The main building is 500 x 176 ft.; the furnace house is 266 x 160 ft.; the boiler house, 240 x 48 ft.; the furnace producer house, 120 x 38 ft.; the open-hearth producer house, 160 x 38 ft.; the hammer house, 80 x 50 ft.; the machine shop, 300 x 86 ft.; the trimming room, 111 x 63 ft; the disk and forging house, 138 x 63 ft.; the spring shop, 165 x 63 ft.; the power house, 40 x 50 ft.

The melting department consists of four 35-ton basic open-hearth furnaces, two 40-ton acid furnaces and two crucible furnaces. The open-hearth furnaces will be served by a Wellman charging machine. In the casting department there are two 50-ton electric cranes with two auxiliary trolleys of 15 tons capacity each. The ingots are to be poured on cars, three molds to the car, and they will be 14 x 16 inches x 5 feet 6 inches. After the molds are filled they will be pushed under a stripper at the end of the casting room next the mill building, and after stripping will be taken to the soaking pits. The doors of the open-hearth furnaces are raised by hydraulics and operated from the rear of the standing. There are two gas houses for the steel furnaces, one furnishing gas for the four basic furnaces and soaking pits, and the other for the acid and crucible furnaces. All the gas flues are connected to the stacks by valves and can be burned out when necessary.

Coming to the mill building, the soaking pits have four holes each with a capacity of six ingots each. The covers are operated by hydraulic cylinders and the charging and drawing are performed by an electric traveling crane furnished by the Case Mfg. Co., of Columbus, O.

The blooming mill delivers on the north side of the mill building, or the upper side, as shown in the plan, and the product is taken from the shear to the heating furnaces, all of which, as will be seen, are on the same side of the mill. The 120-inch mill will finish its product from ingots without blooming.

The 72-inch plate mill has two furnaces, each of which has a 3-ton hydraulic crane for charging and drawing. On the finishing side of the roughing rolls the pieces are raised on a table operated by a steam cylinder and a tilting table at the finishing or catcher's side. The next mill is a sheet mill operated by an engine which also drives a 21-inch mill for rolling wide bars and plow slabs. The 18 inch mill is driven by an engine 30 x 50 inches. The product of this mill is rounds, squares, angles and flats and some billets for the 8-inch mill. Next in line are two sheet mills, one 24 x 54 inches and one 42 x 24 inches. The 12-inch guide mill comes next, and on this are rolled angles from 2 to 3½ inches, flats from 1¼ inches, and rounds and square from ⅝ inch to 2 inches. The 8-inch mill is last. On this are rolled sizes and shapes too light for the 12-inch mill.

The hammer house contains a 5-ton steam hammer and gas furnace, and here the company hammers its composite material. A 5-ton hydraulic crane serves the furnace and hammer in this building.

The boiler house contains 24 boilers of 150 h. p. each. On its north side, as shown, is an elevated track for supplying the boiler furnaces and the gas producers with coal. The boilers are direct fired.

All the mills (except the blooming mill) deliver on the south side, on which runs a depressed track for loading the product for shipment. Most of the product of the 21-inch mill and part of the product of the first sheet mill goes to the trimming room, where it is cut and punched into the various shapes used by agricultural implement manufacturers, also into circles for disks, which are then taken to the next building, the forging and disk department, and rolled and pressed into shape. In this building also are small hammers and forges for finishing some of the product of the crucible furnaces. The spring department for making elliptical springs is the next building, and has a capacity of 50 tons of springs per day. On the south side of these two buildings is another depressed track for shipping the product of each.

The machine shop and foundry is equipped with a Morgan traveling crane which runs the entire length of the building. This crane was designed and originally operated as a square shaft crane. Since its erection at the Burgess plant a motor has been applied to it and the square shaft abandoned. The material for the cupola, in the foundry, is raised by a hoist operated by a clutch arrangement.

The power house has installed in it two generators of 90 k. w. capacity, furnished by the Westinghouse Machine Co.' and driven by a 20 x 22 slide valve center crank engine. The power house furnishes power for the machine shop and foundry electric crane, electric crane in the casting house, also power for the shaft in the machine shop, and motors for driving the shears in the mill. The pump house contains four 8-inch deep well-pumps furnished by the John H. McGowan Co., of Cincinnati. The water is pumped into a tank elevated about 20 ft., and is 40 x 20 x 8 ft. Analysis shows the water to be exceptionally pure.

The Portsmouth Foundry & Machine Works, of Portsmouth, furnished two of the mill engines—those for driving the 24-inch mill and the 18-inch bar mill. The cylinders are 30 x 50 inches, with piston valve arrangement. The 12-inch mill engine is a Buckeye, 24 x 38 inches. The 8-inch mill engine is a Russell, 20 x 24 inches. The small plate mill and the plow steel mill will be driven by an engine which the Burgess Steel & Iron Works are now building, and the engine for driving the 120-inch plate mill will also be constructed by the company.

With the new plant the Burgess Steel & Iron Works will have more than twice their former capacity; and their mills for wide plates will be ready for business none too soon under conditions which are crowding plate mill capacity all over the country to its utmost. Having its own blast furnace and its large capacity for the production of basic and acid open-hearth steel the company will be no small factor in its special lines. Its products are plates particularly boiler steel, angles, plow steel, tool steel, five-ply safe steel, and spring, tire and machinery steel. The officers are: L. D. York, president and superintendent; John E. Jones, vice-president; B. F. Vincent, secretary and treasurer.

New Steel Car Works.

Several rumors have been in circulation in Pittsburg in the past few days that the intention of the Carnegie Steel Co. to build a steel freight car works had been abandoned, in view of the fact that the new car manufacturing consolidation would be enabled to supply the demand, and had made an arrangement with the Carnegie Steel Co. for a very large tonnage of plates for a term of years. The rumors are denied officially, and the statement is made that work on the new car plant is being pushed vigorously, so that in the shortest possible time the company will be turning out steel freight cars.

The plans formulated some time ago by the Schoen Pressed Steel Co., Pittsburg, for the erection of a new steel car works, to have a capacity of 40 cars a day, are to be carried out by the Pressed Steel Car Co., into which the Schoen company was merged recently. The plant will have a capacity of 40 cars a day, and will cost about $1,000,000. Orders for most of the machinery have been placed already, and plans are complete for an immediate commencement of building operations as soon as the site is secured. Negotiations are now almost completed in regard to a site, but until a completion of the deal, which may be in the latter part of this week, information is withheld as to the exact location, except that it is in Western Pennsylvania.

Pig Iron Production in 1898.

The statistics of pig iron production in 1898 are of special interest, as marking by far the greatest output ever attained in the United States. We give below the tables and the comment upon them, as they appear in the current issue of the *Bulletin* of the American Iron and Steel Association. Nineteen States made pig iron in 1898, the same number as in 1897 and the same States.

The total production of pig iron in 1898 was 11,773 934 gross tons, against 9,652,680 tons in 1897, an increase of 2,121,254 tons, or very nearly 22 per cent. Large as was the increase in tonnage in 1898 as compared with the production in 1897, it was not so large as the increased production in 1895 over the production of 1894. In 1894 we made 6,657,388 tons and in 1895 we made 9,446,308 tons, an increase of 2,788,920 tons, or nearly 42 per cent. There have been other years in our history, notably 1880 and 1886, in which the percentage of increased producttion exceeded that of 1898. But 1898 was a great year, nevertheless, for the pig iron industry of this country.

Contrary to the general impression the increased production in 1898 was not mainly in the last half of the year. The production in the second half exceeded that of the first half by only 34,528 tons, as the following table of half-yearly production will show:

Periods.	1895.	1896.	1897.	1898.
First half.	4,087 558	4 976,236	4,403,476	5,869 703
Second half.	5,358,750	3,646,891	5,249,204	5,904,231
Total.	9,446,308	8,623,127	9,652,680	11,773,934

The production of pig iron by States and the furnaces in blast and those out of blast at the close of 1898 are shown in the following table. On Dec. 31, 1898, there were 202 furnaces in blast. Their weekly capacity at that date was about 247 500 gross tons, or at the rate of 12.870,000 tons per annum:

TOTAL PRODUCTION OF PIG IRON.

States.	Blast Furnaces. In blast June 30, '98	Dec. 31, 1898. In	Out	Total	Production. Gross tons of 2,240 lbs. (Includes spiegeleisen.) First half of 1898.	Second half of 1898.	Total for 1898.
Mas achusetts	1	1	2	3	1 243	2,418	3,661
Connecticut	1	1	4	5	3,426	2,910	6,136
New York	5	4	15	19	114,114	113,897	228,011
New Jersey	4	5	5	10	54,695	45,986	100,681
Pennsylvania	74	79	79	158	2,767 549	2,770,283	5,537,832
Maryland	3	2	6	8	105,684	85,290	190.974
Virginia	7	9	18	27	126,941	156,333	283,274
North Carolina			2	2			
Georgia	1	1	3	4	7,315	6,447	13,762
Alabama	18	20	24	44	511,848	521,828	1,033,676
Texas		1	3	4	1,817	3,361	5 178
West Virginia	3	3	1	4	104,516	88,183	192,699
Kentucky	4	5	4	9	48,730	51,994	100,724
Tennessee	7	8	11	19	130,820	132,619	263,439
Ohio	30	34	21	55	998,951	987,407	1,986,358
Illinois	15	15	2	17	666,580	699 318	1,365 898
Michigan	6	6	6	12	74,848	72,792	147,640
Wisconsin	2	4	2	6	91,679	81,102	172,781
Minnesota			1	1			
Missouri	1	2	1	3	58,947	82,063	141,010
Colorado	1	2	1	3			
Oregon			1	1			
Total, 1898	183	202	212	414	5,869 703	5,904,231	11,773 934
Total, 1897	146	191	232	423	4,403,476	5,249,204	9,652,680

Production according to fuel in 1898 is shown in the table below. The production of charcoal pig iron in 1898 was 296,750 tons, against 255,211 tons in 1897 and 310.244 tons in 1896. The manufacture of pig iron in this country with unmixed anthracite coal is a rapidly decaying industry. In 1897 we made only 21,149 tons of pig iron with anthracite alone, and in 1898 we made only 22,274 tons. In both 1897 and 1898 New York did not make any pig iron with anthracite coal, either mixed or unmixed. The foregoing table shows also the unsold stocks in the hands of makers, according to fuel, at the end of the four half-year periods terminating June 30, 1897; Dec. 31, 1897; June 30, 1898, and Dec. 31, 1898.

UNSOLD STOCKS AND PRODUCTION ACCORDING TO FUEL.

Fuel.	Stocks Unsold Gross tons of 2,240 lbs. June 30, 1897.	Dec. 31, 1897.	June 30, 1898.	Dec. 31, 1898.	Production. Gross tons of 2,240 lbs. (Includes spiegeleisen) First half of 1898.	Second half of 1898.	Total for 1898.
Bituminous	446,114	339,793	289,232	115,615	5,687,491	5,186,420	10,273,911
Anthracite	143,590	106,901	123,848	83,976	635,209	568,064	1,203.273
Charcoal	237,459	209,795	158,497	91,642	147,003	149,747	296,750
Total	827,163	656,489	571,577	291,233	5,869,703	5,904,231	11,773,934

The stocks of pig iron which were unsold in the hands of manufacturers or which were under their control in warrant yards or elsewhere on Dec. 31, 1898, and which were not intended for their own consumption, amounted to 291,233 gross tons, against 571,577 tons which were similarly held on June 30, 1898, and 656,489 tons on Dec. 31, 1897. These figures of unsold stocks do not include pig iron sold and not removed from the furnace bank. Charcoal stocks were reduced during 1898 from 209,795 tons to 91,642 tons. It is noteworthy that the unsold stock of charcoal iron in Michigan, which was 109,272 tons at the close of 1897, had fallen to 24,598 at the close of 1898. The unsold stocks at the close of 1898 were 2.4 per cent of the total pig iron production of the year. *This was the lowest percentage of unsold stocks ever recorded at the close of any year in the last 25 years.*

In addition to the stocks above noted as unsold on Dec. 31, 1898, there should be added 124,100 tons in the yards of the American Pig Iron Storage Warrant Co. which had passed out of the hands of the makers, making 415.333 tons which may be said to have been then on the market, against 756,336 tons which were similarly held on June 30, 1898, and 874,978 tons on Dec. 31, 1897. The total quantity of stocks in this company's warrant yards on Dec. 31, 1898, was 150,800 tons, against 258,000 tons on June 30, 1898, and 275,800 tons on Dec. 31, 1897. The distribution of unsold stocks at the end of the last four half-year periods is shown in the following:

TOTAL STOCKS OF UNSOLD PIG IRON.

States.	Gross Tons of 2,240 lbs. June 30, 1897.	Dec. 31, 1897.	June 30, 1898.	Dec. 31, 1898.
New England	9,073	8,103	5,576	4 339
New York	72,658	36,444	27,322	25,005
New Jersey	10.752	7,730	10,525	1,851
Pennsylvania	197,634	208,860	196,599	108.805
Maryland	1,209	2,179	1 475	2,422
Virginia	67,615	70 509	35,825	18,882
North Carolina, Georgia and Texas	20,104	16,791	15,491	14,366
Alabama	129,223	56,020	68,239	27,166
Kentucky	12 741	10,546	12,368	5.545
Tennessee	55,054	25,008	28,093	24,389
Ohio	119,035	76,238	62 554	26,910
Michigan, Indiana and Minnesota	101,603	109,272	71,604	24,598
Illinois and Wisconsin	24,173	12,939	35,919	5,053
Missouri and Colorado	5,102	14,663		
Pacific States	1 187	1,187		
Total	827 163	656,489	571,577	291,213

STOCKS OF PIG IRON IN PENNSYLVANIA AND OHIO.

Pennsylvania.	Lehigh Valley	46,302	35.952	45,298	27.949
	Schuylkill Valley	43.933	22,301	22,676	9,926
	Upper Susquehanna Valley				
	Lower Susquehanna Valley	20,394	19,870	25,846	26,076
	Juniata Valley	4.348	533	497	8,533
	Allegheny County	24,905	25,743	12,931	1,246
	Shenango Valley	28,567	64,532	58,836	27,583
	Miscellaneous bituminous	22,021	32,463	23,303	100
	Charcoal	7,164	7,466	7,212	7,392
Ohio.	Mahoning Valley bituminous	77,170	38,148	38,567	15,070
	Hocking Valley "	580	500	500	1,150
	Lake Counties "	2,859	9,900	5,627	
	Miscellaneous "	6,380	5,405	901	1,891
	Hanging Rock "	20,250	11,982	8,577	5,900
	Hanging Rock charcoal	11,796	10,303	8,382	4,899

The production of Bessemer pig iron in 1898 was 7,337,384, tons against 5,795.584 tons in 1897, an increase of 1,541,800 tons. In 1896 the production of Bessemer iron was 4 654,955 tons and in 1895 it was 5,623,695 tons. The tables following show the Bessemer production in 1898 by States and, in the case of Pennsylvania and Ohio, by districts.

The production of basic pig iron in 1898 was 785,444 tons, against 556,391 tons in 1897, an increase of 229,053 tons. The production of basic pig iron in 1898 was distributed as follows: Allegheny county, Pa., 378,156 tons; other counties in Pennsylvania and New Jersey, 205.192 tons; Maryland and Virginia, 54.535 tons; Alabama, 100 294 tons; and Ohio, Illinois, Wisconsin, and Missouri, 47,267 tons. The production of spiegeleisen and ferromanganese in 1898 was 213,769 tons, against 173.695 tons in 1897, 131,940 tons in 1896, and 171,724 tons in 1895.

PRODUCTION OF BESSEMER PIG IRON IN PENNSYLVANIA AND OHIO.

Ohio. Pennsylvania.	Lehigh Valley	38,434	36,686	75,120
	Schuylkill Valley	26,2-7	28,884	55,141
	Upper Susquehanna Valley	50,444	46,222	96,666
	Lower Susquehanna Valley	182,027	178,282	360,309
	Juniata Valley			
	Allegheny County	1,210,249	1,249,015	2,459,264
	Shenango Valley	368,815	256,410	625,225
	Miscellaneous bituminous	177,548	191,692	369,240
	Mahoning Valley and H. Rock bit	295,367	250,108	545,475
	Hocking Valley			
	Lake Counties	173,833	188,915	362,748
	Miscellaneous bituminous	330,737	331,575	662,312

PRODUCTION OF BESSEMER PIG IRON.

States.	Gross tons of 2,240 lbs. 1st half 1898.	2nd half 1898.	Total for 1898.
Pennsylvania	2,053,774	1,987,191	4,040,965
Maryland	103,379	83,184	186,563
West Virginia	104,516	88,183	192,699
Ohio	799,937	770,598	1,570,535
Illinois	587,445	622,679	1,210,124
Michigan and Wisconsin	5 602	11,957	17,559
Missouri, Colorado	48,931	70,008	118,939
Total	3,703,584	3,633,800	7,337,384

On the question of reserve capacity Mr. Swank says: "The whole number of furnaces out of blast on Dec. 31, 1898, was 212. A large number of these furnaces cannot be expected to go in blast again under any conditions Others may be expected to go in blast at an early day under the favorable conditions that now prevail. A few new furnaces that are already completed or nearly completed will go in blast this year under any conditions. Making a survey of the whole field, and eliminating all furnaces that are never likely to run again, we estimate the actual idle furnace capacity of the country to-day at 4,500,000 tons per annum, of which probably 2,500,000 tons will be available in the next six months if there should be an extraordinary demand for pig iron."

Production and Consumption of Iron.

In their current review of conditions in the pig iron market, Rogers, Brown & Co. say: "Those who have closely observed the statistics of the pig iron production of the country have felt for several years that, should an era of general activity of the industries of the country such as was experienced in 1889 and 1890 be realized again, the blast furnace capacity would be inadequate for the demands. It is true that modern methods and appliances have augmented the capabilities of old plants, but there has been comparatively no new construction, so that the increased output has been largely from modernized furnaces built in former years, and to these improvements and betterments we are indebted for an escape from a possible famine in iron to-day. While it may seem superfluous to some to repeat old familiar figures, it will be interesting to many to be reminded that the pig iron production of the country in the years given was as follows: 1858, 629,548 gross tons; 1868, 1,431,250 gross tons; 1878, 2,301,205 gross tons; 1888, 6,489,738 gross tons; 1893, 11,754,000 gross tons (estimated). It will be readily observed that we doubled every decade, and those who have watched the trend of the trade have realized that there was insufficient preparation being made for an expansion of product in keeping with reasonable expectations of needs. The champion of all the optimists dare not prognosticate the prosperity that has come, nor was it possible to foresee the marvelous development of American manufacturing interests.

"The vitalizing of a few of the stacks that have stood as silent monuments of over-sanguine enterprise will contribute some relief, and, it is hoped, amply meet the legitimate requirements, but producers and consumers alike must exercise prudence to avert the calamity of an unmanageable market. Notwithstanding production is on the highest plane the country has ever attained, the visible supply of iron went off in December nearly 46,000 tons, leaving on furnace banks and in storage yards stocks aggregating very little over 500,000 tons of all qualities and grades, which, at the rate of current consumption, which exceeds a million tons per month, it will be seen is scarcely two weeks' supply. During the past week a large number of buyers have found the market bare of Southern mill irons and some foundry grades, and are obliged to wait and avail themselves of such opportunities as may arise for further supply. Many of the furnaces North and South refuse to accept orders for any grades, some of them being sold up for six months or more. It is commendable that the furnaces continue conservative, and that those in the market are willing to sell at figures reasonable and acceptable to buyers."

ANENT THE PHILIPPINES.

Jacob Reese, of Philadelphia, who in other days was an occasional correspondent of *The Iron Trade Review*, has a communication in the Philadelphia *Press* giving some reasons why the United States should hold the Philippines. Our friend calls our attention to the article as one dealing with a subject important to the iron and steel trade, and therefore of interest to our readers. We have not space for it all, but make a single extract The subject is only incidentally pertinent to the iron industry, belonging to that increasingly voluminous body of literature that has to do with the new destiny of the United States as a world purveyor; but we take the opportunity to say that between sentimental and humanitarian arguments on the one hand and selfish and commercial considerations on the other, the facts and equities of the Philippine situation have suffered. The United States does not hold the Philippines to-day and therefore the question of "holding on" is not a debatable one. The sooner the accidental relation into which this country has come to certain of the heterogeneous peoples of those islands can be terminated with dignity and honor, the better. But to the extract from Mr. Reese's article:

"We have now improved the processes of manufacture and developed the national resources to such an alarming extent that for some years the product of our manufactories has exceeded the domestic consumption, consequently competition became drastic and wages were reduced to such an extent that the workmen could not live unless provided with steady work. This forced our manufacturers to seek foreign orders for export for their excess production. We are at the parting of the ways that require an open door for the product of our mines, furnaces, mills and machines, so that we may secure an export market for the product of these mines of national wealth and thus keep our people continuously employed with profitable labor. This is a natural and a national demand. The fittest will prevail and all barriers will disappear. We want an open door to Asia, an open door to China, where our goods and manufactures will be a benefit to the people and of great profit to us. To get there we need, and must have, a magnificent highway from the Atlantic coast through the isthmus and over the Pacific Ocean to Hong Kong in China—a highway traversed by an improved merchant marine under Government patronage, composed of American-built ships, manned by American citizens and adorned with the American flag. And as this is a long route and a great shipping distance, we shall absolutely require a series of relays where vessels can go in for repairs, provisions and coal, and if need be for protection. And without going into details of the required relays, I claim that the best and most important marine relay from the Atlantic to the China Sea will be the Philippines. They form the grandest naval rendezvous in the world and can be made the Gibraltar of the China Sea. I look upon the Philippines as the storm-door to China, and if properly fortified and occupied by the United States, they will stand as a godfather to the Chinese Empire, as an everlasting protection against her dismemberment by extraneous foes.

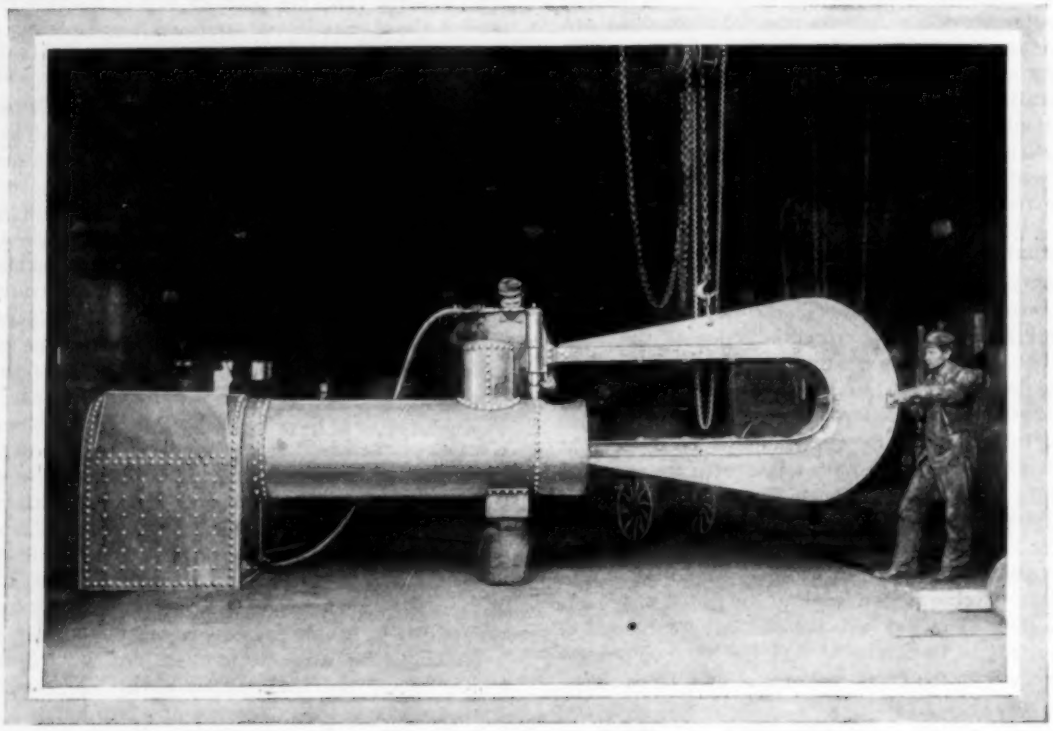
"The fortune of war has very wonderfully and altogether unexpectedly brought us to the Philippines, and the stipulations of the treaty of peace have placed them in our hands as trophies of war and conditions of peace, and we should not hesitafe for a moment in accepting them and ratifying the treaty of peace. The question of what shall be done with the Philippines or what kind of government shall be established in them is not in the treaty nor could it properly be there. The treaty relates exclusively to matters between Spain and the United States, and the question even 'Shall we take the Philippines?' should be relegated to the rear, and the question, 'What shall we do with them?' should properly be considered after the treaty has been ratified and the war finally closed."

F A. Gale, who was made manager of the Erie City Iron Works, 34 and 36 W. Monroe st., Chicago, the first of the year, has been successful in securing an order from the Illinois Sugar Refining Co., Pekin, Ill., for 2,300 i. h. p. of Caldwell water tube boilers and Corliss engines. Other recent orders were for a 250 i. h. p. Caldwell water tube boiler for the City of Sturgis, Mich., and a 200 h. p. Caldwell water tube boiler for the village of Morgan Park, Ill.

PNEUMATIC BOILER RIVETER.

The cut shows the Chicago Pneumatic Tool Co.'s large size 1¼-inch x 6-inch Boyer pneumatic riveter, set in a frame having 8 ft. depth of gap, as used in boiler work. The riveter shown is the Boyer patent, arranged so that the admission of the air supply forces it tightly against the rivet before it begins striking. This application has been found very successful, the work being superior to hand work. In the use of this riveter it has been found desirable to insert the rivets from the outside and head them against the dolly bar underneath, thus keeping the rivet heads in perfect line, which is a great desideratum with boiler makers.

The frame is made from two plates with angle bar on the outside and trussed together as shown in the cut, thus avoiding excessive weight and yet securing the necessary rigidity for the operation of the riveter. It is suspended from the chain hoist at a point where it will most nearly balance so that it is very easily handled and can be swung into position for work without any difficulty. This tool has found favor among boiler makers and others requiring riveters with long reach of frame. It can also be adapted to any kind of frame desired and is applicable to all sorts of riveting, having capacity of driving rivets up to 1½ inches in diameter. The same company has recently brought out some large hand hammers for riveting, having a capacity for driving rivets up to 1 inch in diameter. These are especially adapted to bridge and structural erection and other work where yoke riveters cannot readily be used.



PNEUMATIC BOILER RIVETER.

RECEIVED FROM THE TRADE.

The January announcement blotter of the Kentucky Fire Brick Works, Portsmouth, O., promises the early publication of a booklet illustrating the home of "Kentucky Steel," "Franklin Crown" and "Sligo" brands of fire brick.

Among conspicuous iron trade calendars for 1899 are those of Bassett, Presley & Train, of Cleveland, jobbers in finished iron and steel, and of Reese, Hammond & Co., Bolivar, Pa., manufacturers of fire brick.

The Bourne-Fuller Co., Cleveland, has recently sent to the offices of consumers of plates, sheets, bars, pipe, shapes and other finished material, a steel letter-opener with ornamented celluloid handle bearing the name of the company on one side and on the other, "Iron, steel and pig iron."

An attractive calendar for 1899, with a handsome lithograph in colors, is the latest form of announcement from the Joseph Dixon Crucible Co., Jersey City, N. J. It follows up the booklet entitled "Pencilings," which was published a short time ago, and contains some sketchy illustrations of the work on which the various grades of the Dixon graphite pencils are employed.

The Leschen-Macomber-Whyte Co., 19 and 21 South Canal st., Chicago, dealers in wire rope and cordage, iron, steel and copper wires, and contractors' mine, quarry and railroad supplies, make use of a celluloid calendar case, with changeable monthly cards, in announcing their specialties.

In its interesting and attractive circular entitled "Draft Without a Chimney," the B. F. Sturtevant Co., of Boston, Mass., tells why its tall chimney has been taken down, how draft is now produced and how an annual fuel saving of nearly $1,000 is secured.

J. Wendell Cole, whose headquarters for the sale of emery wheels, lathe center grinders, tool and drill grinders, emery, corundum and wet-work wheels, are in Columbus, O., and Chicago, has devised an ingenious copyrighted calendar which is going to the trade with his compliments. There is but one set of figures, from 1 to 31, and the names of the months and of the days of the week are so arranged that the year's calendar is given in a nutshell.

H. S. Vrooman, 220 W. 20th st., Chicago, sends out a description of his patent arch fire brick. The brick are made with a shoulder which gives independent support to each brick and relieves the outward pressure on the side walls. The end pieces are special shapes. These brick give a flatter roof for furnaces and permit of building larger furnaces of annealing and reverberatory types.

From the Vitrified Wheel Co., of Westfield, Mass., manufacturer of emery and corundum wheels, grinding machines and kindred specialties, we have an attractive catalogue. It tells of the patent granted in 1864 for the manufacture of emery wheels by the vitrified process and of the formation of the Vitrified Wheel Co. in 1871 to work the process. The small proportion of wheels breaking in service, when made by the company's process, is cited as proof of the results attained. The "Cyclone," which the company has devised, is adapted specially to saw gumming and filing, planer knife grinding, sharpening moulding bits and all wood-working tools. Space is given in the catalogue to wire web wheels, to suggestions for ordering and using emery and corundum wheels, to diagrams of shapes, to special wheels for grinding machines and to descriptions of grinders. Among prominent Central Western agencies of the Vitrified Wheel Co. are Force & Briggs, Pittsburg; the Strong, Carlisle & Hammond Co., Cleveland, and Machinists' Supply Co. and Curtis & Co. Mfg. Co., Chicago.

INDUSTRIAL NOTES.

Dover Furnace, at Canal Dover, O., owned by the Penn Iron & Coal Co., broke all its former records of monthly output in December, 1898. The make was 7,661 tons of Bessemer iron, running on ore mixture yielding 58 per cent, being a daily average make of 247 tons. This furnace stack is 16½ feet bosh by 75 feet high. The best week's work in the month was 1,793 tons, an average of 256 tons daily. The furnace is under the management of David T. Croxton.

The American Tin Plate Co., Chicago, has placed an order with Miller Bros. & Co., Pittsburg, for an annealing furnace to be built at the company's Monessen plant.

A company to operate a railroad in Mexico under a grant from the president of Mexico has been organized by stockholders of the Hidalgo Mining Co., Westinghouse Building, Pittsburg. The charter is secured in Colorado, under the name of the Parrall & Durango Railroad Co., with $1,000,000 capital stock, the principal office being in Denver and branch offices in Pittsburg and Mexican cities. The concessions were secured by Samuel E. Gill, secretary of the Hidalgo Mining Co., of which N. F. Armstrong is president. The directors of the railroad company are Pittsburg parties.

An order of sale was issued last Thursday for the sale of the property of the Jefferson Iron Works, Steubenville, O., which has been in the hands of S. K. Wallace as receiver for several years. The property consists of Jefferson Furnace, which has been operated under lease by the Ætna Standard Iron & Steel Co., Bridgeport, O., and a rolling mill equipped to produce skelp iron and steel, cut nails, etc.

The Bucyrus company, of South Milwaukee, is very busy and the works have been running 24 hours a day for the past 14 months. The company has orders on hand to keep it busy for some time.

The annual meeting of the Citico Furnace Co. was held last week at Chattanooga. The new board of directors consists of H. S. Chamberlain, L. E. Montague, D. P. Montague, H. O. Ewing, O. L. Hurlbut. H. S. Chamberlain was elected president and Frank Nieland secretary and treasurer.

The Roane Iron Co., Chattanooga, Tenn., elected the following directors at its annual meeting: H. S. Chamberlain, T. G. Montague, J. H. Rathburn, H. O. Ewing, E. D. Rees, of Chattanooga; C. M. McGee, Samuel Thomas and A. S. Hewitt, of New York; W. E. Rockwood, of Indianapolis, Ind.; E. R. Forsyth, of Gunnsburgh, Ind., and J. F. Tarwater, of Rockwood. The directors elected H. S. Chamberlain, president; C. M. McGee, vice-president; Orion L. Hurlbut, secretary; Frank Nieland, treasurer.

The Eagle Iron Co., of Chattanooga, Tenn., will start up its charcoal iron furnace at Attala, Ala., capacity 50 tons a day.

A verdict was given last week in the suit of Margaret Campbell, of Long Island City, L. I., against the United States Foundry Co. Mrs. Campbell owned hay sheds adjoining the foundry. They were burned down with contents. She brought suit on the ground that sparks from the cupola stack had caused the fire. The jury found the company responsible and awarded $3,158.31.

The Colorado Fuel & Iron Co. has closed with the Denver & Rio Grande for 7,500 tons of steel rails.

The Carnegie Steel Co. is erecting a large frame building at Homestead, for the occupancy of the workmen who will be employed in the new mills being erected. It will be 150 x 20 feet and will accommodate 500 laborers.

Cumberland Furnace, near Clarksville, Tenn., is to start up soon.

F. Michel has recently taken the brick building 38-40 Indiana st., Buffalo, which gives him largely increased storage capacity near the centre of the manufacturing district of the city. While dealing in scrap iron of all kinds in large or small lots, he is making a specialty of metals and carries a stock of second-hand pipe.

The Firth-Sterling Steel Co., of Pittsburg, has just secured orders from the Government for a large lot of eight-inch projectiles for use in the army. The contract will amount to about $100,000. The order is a part of one first let to the projected Mannesmann Tube Co., of Chicago, in the recent war with Spain, and is now divided between the Pittsburg company and the Carpenter Steel Co., of Reading, Pa.

The Westerman rolling mill, West Marion, Ind., which it was reported would close down Feb. 1 on the expiration of the present lease, is still being operated by Geo. R. Stewart and probably will be kept going through the year.

An officer of the Tennessee Coal, Iron and Railroad Co. says that its exports of pig iron are 1,000 tons a day, that it is marketing 350,000 tons of coal a month, an increase of 10 per cent over a year ago, and that its output of pig iron—now about 50 000 tons a month—will be increased in the next 60 days by 500 tons a month. Arrangements have just been completed for the retiring of $700,000 of its 7 per cent bonds that are subject to call. These are the $400,000 Eureka and $300,000 Alice 7 per cents.

The Walburn-Swenson Mfg. Co. foundry and machine shop, Chicago Heights, Ill., is about to extend the plant with a building 60 x 200 feet, one story high. The present works are too small to accommodate the business.

The King & Andrews Co., Chicago Heights, Ill., whose new works were built last year, is already obliged to enlarge. An addition to the foundry will be 50 x 100 feet.

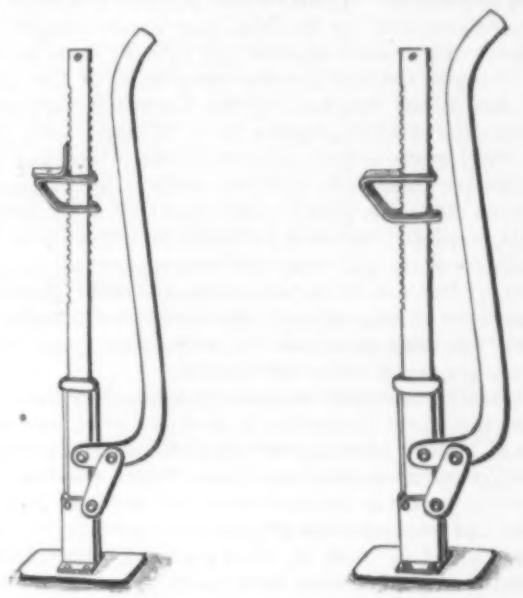
The Bliss & Laughlin Co., manufacturer of shafting, Harvey, Ill., recently completed a large addition to its plant and is now erecting another building, which will be a one-story brick, 40 x 217 feet.

The Davis & Furber Machine Co, Lawrence, Mass., will build a foundry with all modern equipment this spring.

Two continuous bar mills are to be erected by Jones & Laughlins, Ltd. They will have a capacity of 300 to 400 tons a day.

COVERT CARRIAGE AND WAGON JACKS.

The illustrations show the Covert steel carriage and wagon jacks manufactured by the Covert Mfg. Co., of West Troy, N. Y. The carriage jack weighs six pounds and is exceptionally strong for this weight, lifting 1,000 pounds. The step is



CARRIAGE JACK. WAGON JACK.

leather covered, thus preventing the metal coming in contact with the axle and marring the paint. The step being moveable can be readily adjusted to the height of any axle. There is a direct perpendicular lift, without the objectionable horizontal or oscillating movement often found. The Covert steel wagon jack is made for heavy work. It weighs 10 pounds and will lift over 2,000 pounds It is of the same design as the carriage jack.

W. T. MANNING, Baltimore, Md., chief engineer of the Baltimore & Ohio railroad, has invented a T rail for use on curves, where the wear on the side of the rail is especially heavy, on account of the pressure frequently exerted by the flange of the car wheel against the side of the head. The section contains considerably more metal in the head and the side on which the wear comes is made especially heavy. It is claimed that the cost of renewal should be very materially reduced. The Baltimore & Ohio has ordered 1,000 tons of the new section, and the Pittsburg & Western 500 tons, from the Carnegie Steel Co., Ltd., in order that a thorough test may be made as to the wear of the section on curves.

DIRECT UTILIZATION OF PRODUCER GAS IN EUROPE.

We reproduce below a review, contributed to the *American Machinist* by E. P. Buffet, of an article written for *Le Genie Civil*, Paris, July 23 and 30, 1898, by M. Aug. Dutreux, engineer at the forges of Chatillon, Commentry and Neuves-Maisons. It is a review of the results, so far as known, that have been obtained in Europe with the use of producer gas in gas engines. His data are in part obtained from previous publications and in part of his own collection. His conclusions are to the effect that all the objections commonly raised against this employment of producer gas can be, and have been, overcome.

Those objections are chiefly as follows:

1. Very feeble calorific power of the gas, and its variable composition.
2. Dust getting into the cylinders and wearing their mechanism.
3. Difficulties of ignition arising from the great quantity of inert gas.
4. Variations of the pressure of the gas.
5. Too great dimensions of the engine cylinders required, because of the feeble calorific power of the gas.
6. Difficulty of starting motors of high power.

In answering the first point, recourse is had to a theoretical study of producer gas by M. Hubert, engineer of the Corps of Mines, of Belgium, founded upon data obtained by Mr. Hiertz, the blast furnace manager of the John Cockerill works at Seraing, Belgium. Assuming the characteristic ratio of the operation of the furnace, that is the proportion of carbonic acid to carbonic oxide, to be .5 or .7, the calculations give, respectively, 1,166 and 1,046 calories per cubic meter of the gas when reduced to a standard of 0° Centigrade and 760 millimeters of pressure. Actual tests of producer gas made with the calorimetric shell by Mr. Witz gave a maximum of 1,084, a minimum of 961, and a mean of 997 calories with 12 samples. This goes to prove that the composition of the gas is quite constant, and it agrees with the theoretical computation in showing the calorific power to be, in decimal units, about 1,000. In a study of the subject published in *Stahl und Eisen*, March 15, last, Mr. Lurman, constructing engineer at Osnabrück, Germany, gave a mean figure of 879.6 calories. In either case the power does not seem so feeble as to preclude the use of the gas, when it is remembered that the gases made in the Dowson, Buire-Lencauchez and other generators and employed in engines give only about 1,300 calories, and that the long step downward to them from 5,500 calorie illuminating gas was taken with facility.

M. Dutreux proceeds to calculate the available power resulting from the direct utilization of producer gas. Assuming, as does M. Hubert, following the experimental data of Messrs. Kennedy, Hopkinson and Beauchamp-Tower, that the efficiency of the engine in indicated work would be 21.1 to 22.8 per cent, and its mechanical efficiency 80 per cent, the effective work would be 16.88 to 18.24 per cent. The aforesaid experiments were conducted many years ago with engines of 11 to 17 h. p., while to-day much larger ones are frequently employed, and contracts of guaranty sometimes provide for an effective work of 23 to 24 per cent. If, however, the minimum figure, 16 88, be taken, and it be assumed that 50 per cent of the gas is utilized in the engine, M. Dutreux finds that a furnace plant of 600 tons production per day, such as that of the Société John Cockerill at Seraing, Belgium, should give 18,000 or 14,000 h. p., according as the characteristic ratio of the gas were .5 or .7. The steam power actually derived from the Cockerill furnaces is 2,300 h. p. It might be possible to obtain 3,000 in the same way, but from there to 14,000 or more, which the calculations indicate as a possibility with gas engines is a long stride.

The first attempts to employ producer gas on a large scale made in Europe have been undertaken in Great Britain, Belgium and Germany, the Scotch being, it is believed, the earliest in the field. The Belgians and Germans probably made their experiments independently of the British. The earliest patents upon the process taken out in England were by Messrs. Thwaite & Gardner. In the autumn of 1894, Mr. Thwaite proposed to Mr. James Riley, general manager of the Glasgow Iron & Steel Co., to apply it in that establishment, and a 30 effective h. p. "Acme" gas engine was installed by Mr. Thwaite in the Wishaw (Lanarkshire) furnace of that company to drive a lighting dynamo. A second installation of the Thwaite system has been made at the Frondigham Iron & Steel Works, near Doncaster. In the former case Scotch splint coal was used, and in the latter coke, and it appears that both installations have given entire satisfaction. The uniformity of operation of the engines would appear to be excellent. Mr. William H. Booth mentions having observed the engine at Wishaw for several hours and that during that time he did not notice a single miss-fire. He declared also that the variations of the voltameter did not exceed 1.5 per cent of their normal value. At Barrow, 1,000 h. p. of the Thwaite system was to be installed. By this time a part of it, at least, should be in operation.

Several installations for the use of producer gas have been undertaken in Germany. Some of the German engineers have been bitter opposers of the plan, and this is the more remarkable in view of the degree of perfection attained in that country, both in gas engine construction and in blast furnace management. The question of dust in the gas has disquieted them a good deal. Mr. Lurman exploited, last winter, the results of 143 analyses and spoke discouragingly of the large quantities of dust present in the gases. He attempted to show that the producer gas of the Georg Marienhütte, near Osnabrück, would deposit daily in the cylinders of a 100 h. p. engine 29 liters of gas, occupying a volume of more than 100 liters. Mr. Greiner, who has published some results obtained at the Cockerill works, criticizes this conclusion and maintains that the dust would probably not all be deposited in the cylinders. With the use of six scrubbers described by Mr. Greiner the dust of the gas at Seraing, although considerable, was removed to a perfectly satisfactory extent. The cylinder of the large engine there, after running for three weeks continuously, showed only traces of dust. It is even stated by Mr. Kraft, of the gas so purified, that it fouled the igniting apparatus less than illuminating gas, being almost free from hydrocarbons. M. Dutreux concludes that while the arguments of the German engineers look well on paper it is possible to purify the gas as much as need be without being obliged to have recourse, as Mr. Lurman implies, to cleaning apparatus of the costly sort used for illuminating gas.

One of the German installations is at the works of Hoerde, near Dortmund, and its results are being kept secret. On a visit to the establishment M. Dutreux observed the apparatus designed for cleaning the gas. From a conduit coming from the ordinary purifiers and going to the boilers branches a pipe leading to a dry purifier of 13 to 16 feet in diameter and some 30 feet in hight. In shape it is a vertical cylinder ending at the bottom in a truncated cone. After this purifier come four scrubbers arranged in battery; finally a large reservoir or gasometer, 50 feet in diameter, which serves to store the gas, as in illuminating gas works. The engines are intended for electric work only. It is said that a triphase current will be generated and used to operate the locomotive transporting the ladle of metal from the blast furnaces to the steel works, a mile and a half away, the traveling cranes and the accessories of the rolls, but not the blowers. The engines make one effective stroke of the piston with each revolution. It is stated that the contract under which they were furnished by the Berlin-Anhaltsche Maschinenfabrik provides for the installation first of a 150 h. p. experimental engine and then of a 600 h. p. one if the results of the first one are satisfactory. If the large engine is successful another of the same model is to be put in. The arrangement of the 150 h. p. engine is somewhat complicated, and in view of the large size of the other engines for this early period in the history of the new application of producer gas an unsatisfactory result would be by no means conclusive against its value for that purpose.

It is interesting to recall the first experiments that have been made at the Hoerde works, and which, without doubt, are also the first in all Germany. They are to be placed chronologically between those of Thwaite in Scotland and of Cockerill in Belgium. On October 12, 1895, the German Otto Gas Engine Co. (factory of Deutz) put in operation an engine of 12 h. p., utilizing producer gas of the Hoerde furnaces. This engine had given 12.9 h. p. with poor gas. The experiments lasted four months and a half and gave entire satisfaction. The engine furnished 10.5 effective h. p. at the

speed of 200 revolutions. The indicated work was 11.75 h. p., corresponding to a mechanical efficiency of nearly 90 per cent. The consumption of gas was four cubic meters per h. p. per hour. The Otto Co. did not receive the order for the new engines because they were unable to make quick enough delivery.

The Otto Co. are making an important installation in Silesia, in the works of the Friedenshütte (Oberschelsische Eisenbahn-Bedarfs-Actien-Gesellschaft). The available power will be 1,000 h. p in four units, two of 300 and two of 200 h. p. A 16 h. p. motor used there since September, 1897, has encountered some difficulty, owing to the zinc dust which comes from the minerals employed.

At the famous Krupp works at Essen producer gas is being experimented with, as applied to a "Diésel" engine, but the results have not been made public.

In Belgium some extensive tests have been conducted at the John Cockerill works, and the results have been exploited with great freedom. The first engine—a "Simplex" made by Matter & Cie., Rouen—was put in operation December 20, 1895, and gave eight h. p. at the brake. The cylinder was 7.64 inches in diameter by 13.8 inches stroke, and the number of revolutions 210. With illuminating gas it gave 11 to 12 h. p. This shows that with producer gas an engine can give two-thirds the power that it would furnish with illuminating gas, although the calorific power of the latter is only 850 to 1,000 as compared with 5,000 to 5,500 for the latter.

It must be observed, however, that the proportion of illuminating gas used to air admitted is one to six, while with producer gas the volumes are equal. Further, illuminating gas is used under a pressure of only about four atmospheres, while the producer gas employed in the engine at the Cockerill works was introduced at a pressure of 10 atmospheres in order to obtain a good efficiency.

The fifth objection raised at the start—that relating to the necessity of using extremely large cylinders to obtain power—seems now to have been answered.

The difficulties of ignition have been completely surmounted by the use of powerful and permanent electric sparks. During some observations made in 1897 not a single miss-fire was noticed. This seems to answer objection three.

The engines at Seraing have been found to operate well under any variations of pressure that have taken place—even, if we do not misunderstand M. Dutreux, when the pressure has fallen below atmospheric—and it must be borne in mind that the first engine experimented with was used without a reservoir. This tends to refute objection three.

The last objection which remains for us to examine concerns the difficulty of starting. With the small engine used in the experiments at Seraing, there was some sluggishness in this particular, and the engine did not always start immediately. In a large engine of 150 h. p. there employed the result was accomplished by means of pinions moved by a hand lever and acting upon the fly-wheel. M. Dutreux saw this means employed at Seraing, in May, 1898, and a single man succeeded in starting the engine at the first trial in one minute and 35 seconds. It is certain that one may without difficulty apply an automatic compressed air starter of the nature shown by Fielding & Platt, of Gloucester, at the Brussels Exposition in 1897.

The 150 rated h. p. gas engine now being tried at the Cockerill works has a cylinder of 31.5 inches diameter and 39.37 inches stroke, and a speed of 120 revolutions per minute. It is said actually to have given 203 h. p. at the brake.

M. Dutreux did not know of any works in France having an installation of engines using producer gas. The Société anonyme des fers et aciers Robert, however, had arranged with Mr. Thwaite to install a 250-h. p. engine at the furnaces of Outreau, near Boulogne-sur-Mer. A special system of purification adopted by Mr. Thwaite for coke furnaces was to be employed, and the available electric energy obtained was to be utilized at Boulogne and in the vicinity of the works.

In the grand duchy of Luxemburg producer gas engine installations have been made by at least two companies. At the Differdange furnaces a 60-h. p engine intended for lighting has been put in, and a three and a half h. p. engine to start it. These engines, although made by the same company that furnished those of Hoerde, give two motive strokes of the piston for each revolution, which may be taken to imply that Hoerde's results did not show the ultimate of perfection. A definite trial of the engines at Differdange had not been made at M. Dutreux's writing. Experiments were being conducted by the Société des aciéries de Dudelange with a small experimental engine, having in view the production of 500 electric h. p.

M. Dutreux concludes that the use of producer gas in gas engines is now becoming practicable, and that although the gas engine, because of its high speed, is not easily adapted to driving blowers it is well fitted for generating electric power for distribution throughout iron and steel mills to supplant the appallingly wasteful little engines now employed—the parasites of metallurgical works.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

The Larkin Mfg. Co., of St. Paul, has been incorporated with a capital of $20,000, for the manufacture of packing and mechanical specialties. The incorporators are E. J. Larkin, C. A. Stickney and Howard Wheeler, of St. Paul.

The Western Gas Engine Co., Mishawaka, Ind., will locate in a building once occupied by the St. Joseph Mfg. Co. Water power is provided.

The Pittsburg Mechanical Tool Co., Pittsburg, has been incorporated with capital of $20,000.

The new Vincennes Bridge Co., Vincennes, Ind., which expects to build a plant at once, will buy engines, boilers and an outfit of machinery and supplies, including air compressor, cranes, drill presses, engine lathes, foot lathes, pulleys and shafting, conveyors, chain hoists, emery wheels, blowers, belting, bolt and nut machinery, pipe cutting and threading machinery, punches and shears, twist drills, tool steel, etc.

A rolling mill project is being agitated at Kansas City, Mo., officers of the Weber Gas & Gasoline Engine Co. being prominent in the movement. About 40 per cent of the stock has been subscribed.

A certificate of the incorporation of the Buffalo (N. Y.) Structural Steel Co.,, capital $30,000, organized to manufacture and sell steel, iron and metal products, has been filed. The directors for the first year are Casper Teiper, John G. Wickser, William G. Houck, Avery C. Wolfe.

The Wisconsin Machinery Co., Milwaukee, Wis., asks prices on a number of single-acting presses, also one or two double-acting presses of heavy pattern and capable of doing heavy work. It will also need a shaper of 18 or 20 inches, latest pattern, several drill presses and several lathes, new or second-hand.

T. S. Johnstone, 3,258 Audubon st., New Orleans, is in the market for a second-hand 20-h. p. gasoline engine.

The Harriman Plow & Handle Co., Harriman, Tenn., is in the market for one new or good second-hand, modern, medium size bulldozer, suitable for agricultural implement work; one new or good second-hand, modern, fairly heavy punch and shear, suitable for agricultural implement work, and one new or good second-hand modern double-surfacer.

New Construction:—

The National Brass Works Co., Cincinnati, will erect a building 100 x 200 feet, two stories, and equipped with latest machinery.

A foundry and machine shop is being erected at Canton, S. D.

The Oswego Boiler Works, Oswego, N. Y., burned last October, are to be rebuilt. The owners are John and W M. Jermyn, of Scranton, Pa.

The R. S. Newbold & Son Co., Norristown, Pa., will erect a new boiler shop, 65 x 120 feet.

A company with $5,000 capital has been formed at Bellefonte, Pa., to manufacture a springless lock on which Scott Hauser has a patent. The old car works will be occupied.

The McCormick Harvesting Machine Co. has commenced the construction of a one-story blacksmith shop in connection with its present plant at Blue Island and Western aves., Chicago. It will extend over a area of 55 x 145 feet, and will cost $10,000. James H. Haskins, mechanical engineer for the company, has completed the plans.

Monongahela Furnaces of the National Tube Works Co., at McKeesport, Pa., are to be enlarged. They are now 80 feet high and it is proposed to add 10 feet. Work on the first will be started about March 1. Excellent work has been done at this plant recently, output running as high as 400 tons. It is expected to increase this about 25 per cent. There has been some talk of an additional stack, but this will not be built for the present at least.

The Shenango Machine Co., Sharon, Pa., will add a new building, of steel construction, and install electric cranes and other new equipment.

The plans of the Sargent Co., Chicago, for removal of its plant for the manufacture of steel castings and brake shoes to a location which will allow of greater expansion than the

We Have Heard it Said

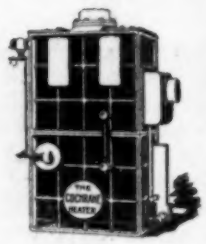
(By those who do not know) that our COCHRANE HEATERS and COCHRANE SEPARATORS are high priced. NOT SO—anything but high priced. May be you got the idea because we keep telling you how good they are—what good things we put in them. Like well built mince pies, they have a first-class casing and "INSIDES," which make them worth trying.

We don't make the cheapest heater on the market—can do it, but won't. Somebody has to decide what should go in a heater. Having 13 or 14 years of experience right in this line—we've decided—and there's no skimping.

No other heater can give hotter water and better purification—is more durable or easier to clean.

Did you ever clean a heater? Not an easy matter unless it's a "COCHRANE."

Shall be pleased to hear from you.



Harrison Safety Boiler Works, Col. Sta., Philadelphia, Pa.

present situation have not yet been fully matured, owing to the press of current business, which is larger than ever before, and occupies the entire capacity of the present plant. In fact, the company has been compelled to refuse orders of late, because of the limitations of its plant. It is expected that arrangements for a new location will be consummated within the next few months.

The Commercial Club of New Albany, Ind., is active in the effort to secure a marine and structural works. M. Zier, of New Albany, and Chicago capitalists are interested.

The Universal Construction Co., Chicago, has taken the contract for the steel work for the Kingman Plow Co.'s new buildings at Averyville, near Peoria, Ill. The main building will be 80 x 442 feet. The total cost of the plant will be about $100,000. The company will buy three boilers 72 inches by 18 feet; five pumps, 5,000 gallons; three engines, one 15 h. p., one 50 h. p., one 300 h. p.; two dynamos, 50 arc lights; woodworking machinery, lathes, planers, three saws; machine tools, three lathes, two planers, four drills, three emerys, 10 grindstones, 10 emerys, six polishers, blacksmith forges, hammers, cutters; miscellaneous and special machinery, punches, bulldozer, riveters, wheel machines, die machines, furnaces, cupolas, fans, exhaust blast.

The New Castle (Pa.) Shovel Works has purchased 10 acres of land for $10,500 near that city, on which to erect a factory. The main building will be 300 x 80 feet.

The Beaver Falls (Pa.) Improvement Association has raised $5,000 cash as a bonus for an Eastern steel manufacturing concern, which asks $7,000 cash and a free site.

C. Seymour Dutton, formerly of the Finished Steel Co., Youngstown, O., proposes to locate a shafting plant at Conshohocken, Pa., and a committee of the board of trade has in hand the raising of $25,000 capital. From outside $75,000 is promised.

Chas. H. Boeck, of Jackson, Mich., is negotiating with Waukesha, Wis., for the removal of his oil stove plant to that place.

The Carnegie Steel Co., Ltd., has placed orders for 9,000 horse power water tube boilers, in addition to the 4,000 horse power mentioned recently as nearly ready for operation in connection with the new plate mills at the Homestead Steel Works. The new boilers will make a total of something like 50,000 horse power of water tube boilers in the one works, outside of a number of two-flue and other types.

The Alcania Co., Pittsburg, which some time ago started the erection of a two-mill tin plate plant at Avonmore, Pa., has found it impossible to make any contract for the supply of tin plate bars when the plant is completed and ready to operate.

Power Equipment and Machine Tools.

The Armstrong Mfg. Co., of Bridgeprt, Conn., which manufactures a general line of water, gas and steam-fitters' tools, sharpens and repairs all dies and bits of its own manufacture which may be returned to the factory by gas and steam-fitters or other users of these tools. This of course does not apply to tools in which the teeth are broken to any extent, as the company does not undertake to insert new teeth. Yet in some cases dies which lack only one or two teeth can be repaired so as to cut threads properly. Tools returned to the factory for the above purpose should be accompanied by full instructions.

The Jeffrey Mfg. Co., of Columbus, O., which recently has taken up the manufacture of standard elevator buckets and spiral conveyors, reports an excellent trade. Its facilities enable it to supply high grade material at prices which secure a large business. Firms in need of material in this line can secure the Jeffrey company's latest catalogue and prices on application.

At Dover, N. H., the creditors of the Somersworth Machine Co. met Jan. 27. The statement of Assignee B. F. Nealley showed the liabilities to be $298,115.06, and the assets $148,955.54. The company's real estate, valued at $103,182.32, is not included in the assets. The creditors appointed an investigating committee.

The Utica, (N. Y.,) Steam Engine and Boiler works held its annual meeting last week. The following directors were elected: J. A. Omens, A. E. Omens, H. C. Norton and George

The Q & C

Shop Saws

Cut Everything. - - - -

No. 1.	Capacity,	4 inches.
No. 2.	"	5 "
No. 4.	"	8 "
No. 8.	"	3x12 "

POWER SAWING MACHINES

For all purposes.

THE Q AND C

Chicago. New York.

Send for Catalogue.

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO,

Proprietors of the CELEBRATED Mount Savage Fire Brick

GOVERNMENT ‡ STANDARD.

Established 1841. Capacity, 60,000 Per Day; 18,000,000 Per Year.

The First Manufactory of its Kind in the U. S.

Home Office and Works:—MOUNT SAVAGE, Alleganv County, Md.

Branch Offices:—No. 1 Broadway, New York, N. Y.; No. 222 So. Third St., Philadelphia, Pa.; Fergusen Block, Pittsburgh Pa., Stowe, Fuller & Co., 249 Arcade, Cleveland, Ohio.

OTIS STEEL

"OTIS" FIRE-BOX PLATES A SPECIALTY.

Flange Plates, Ship Plates, Tank Plates, Steel Car Axles and Forgings of all kinds.

Steel Castings from 100 to 75,000 lbs.

Head Office and Works, CLEVELAND, OHIO.

Agencies: NEW YORK, 97 Cedar St. CHICAGO, Old Colony Bldg.
ST. LOUIS, 516 N. Third St. WASHINGTON, Kellogg Bldg.
MONTREAL, Homer Taylor, 183 St. James St.
SAN FRANCISCO, John Woodlock, 154-156 First St.

Conestoga Building, EDWARD E. ERIKSON, PITTSBURG, PA.

Regenerative Gas Furnaces and Water Seal Gas Producers.

Producer Gas under Tubular Boilers, saving 20 per cent in fuel. NO SMOKE.

The A B C of Iron, Now $1.

The A B C of Iron, Now $1.

FIRE BRICK.

BRANDS: O. K. CROWN. O. K. A.

SUITABLE FOR Furnace, Malleable, Mill, Foundry and Lime Kiln Work.

OAK HILL FIRE BRICK AND COAL CO., OAK HILL, OHIO.

SHENANGO VALLEY STEEL CO., New Castle, Pa.,

MANUFACTURERS OF

Tin Plate Bars, Steel Billets, Blooms and Bessemer Pig Iron.

B. Clark. Officers were elected as follows: President, J. A. Omens; vice-president, George B. Clark; secretary, A. E. Omens; treasurer, H. C. Norton. The reports show the concern in a gratifying condition. The establishment is working on full time.

The Bass Foundry & Machine Co., Ft. Wayne, Ind., has taken an order for a 600-h. p. rolling mill engine for the Falcon plant at Niles, O., and one for a 300-h. p. engine for a Greenfield, O., company.

A petition to have the Charles Munson Belting Co., of 36 Canal st., Chicago, declared a bankrupt has been filed by four Eastern banks, which hold notes amounting to $45,000.

The Pittsburg Mechanical Tool Co. is being incorporated with $100,000 capital stock. The company was organized to manufacture mechanical tools invented by Peter R. Roberts, a mechanic of Pittsburg, who has been working on the inventions for a number of years. Jan. 24 Mr. Roberts was granted a patent on one of the inventions, and it is understood he has 17 other patents, granted some time ago, for similar devices. The tools are for machinists' use, including surface gauges, etc. Other patents are pending in the United States and in foreign countries. The recently organized company has leased 4,000 square feet of space in the Imperial Power Building, corner of Third st. and Penn ave., Pittsburg, and will manufacture the tools, employing about 32 men at the start. Some large orders have already been secured, partly from Europe. Dr. John M. Duff, whose office is at 505 Penn ave., Pittsburg, is to be president of the company. It is stated that Mr. Roberts will receive for his inventions $25,000 in stock and $50,000 cash, and will be general manager of the establishment.

The common pleas court at Akron, O., in the case recently brought by creditors of the J. C. McNeil Co., manufacturer of boilers, to terminate the receivership and sell the plant, declared that the conduct of the business under the receivership had been quite satisfactory, and that the interests of all concerned would be served by its continuance. Dr. A. M. Cole, one of the receivers has resigned, leaving J. B. Campbell sole receiver.

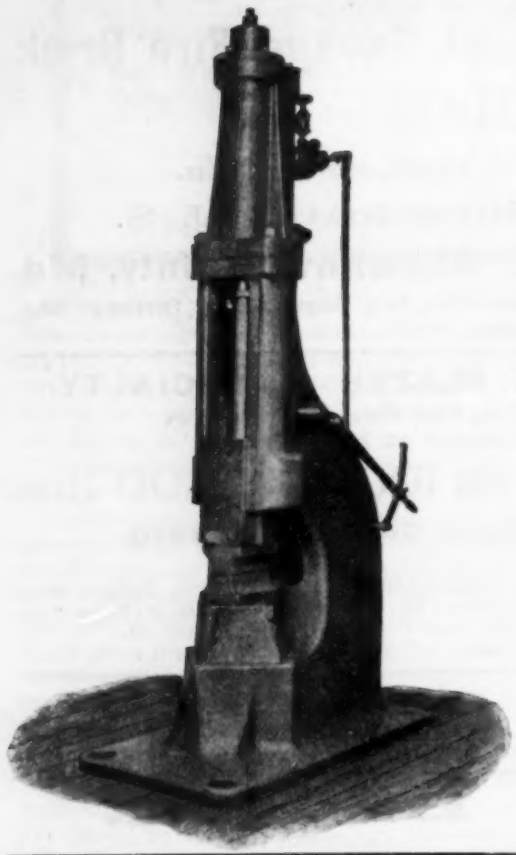
Robert L. Crane, 603 Guarantee Bldg., Buffalo, N. Y., representing the Cincinnati Milling Machine Co., the Prentiss Tool & Supply Co. and the Grant Machine Tool Works, is enjoying a very satisfactory trade, each month adding to the record of the preceding one.

A syndicate of Boston capitalists has purchased the Brainard Milling Machine Co., of Hyde Park, and the Becker Mfg. Co., of Fitchburg, Mass., and it has organized the Becker-Brainard Milling Machine Co., with a capital stock of $500,000. The Becker Mfg. Co. will be moved to Hyde Park, where a modern shop is being erected.

Reade & Bowler, of Cleveland, have opened at 20-22 Frankfort st., a machinery depot for the sale of second-hand machinery. They occupy a building 50 x 100 feet, three floors and a basement. They also carry a large line of second-hand belting, small tools, engines, shop fixtures, etc.

MACHINE TOOLS.....

Of All Kinds and the Leading Makes



Steam Hammers,
Air Compressors,
Pneumatic Hoists,
Harrington Hoists,
Drill Presses,
Milling Machines,
Screw Machines,
Engine Lathes,
Turret Lathes,
Shapers,
Gear Cutters,
Bolt Cutters,
Morse Twist Drills to 3 in.,
Armstrong Pipe Stocks,
Brown & Sharpe Cutters,
Lathe and Drill Chucks.

LARGE STOCK ON HAND.

U. BAIRD MACHINERY CO.

423-425 Water St. **PITTSBURG, PA.** 424-426 First Ave.

P & B

PAINT

The best preservative for IRON AND WOOD work exposed to moisture or the actions of acids, alkalies, coal-gas, etc. Contains no oil or tar. Is durable, penetrating and elastic. Of special value for coating roofs, stacks, tanks, vats, etc.....

Write for prices and further particulars.

THE STANDARD PAINT COMPANY

SOLE MANUFACTURERS

NEW YORK: 81-83 John Street
CHICAGO: 189 Fifth Avenue

McDOWELL

SEMI-STEEL

PROCESS.

(Cupola metal.) Government tests 36,000 to 49,000 tens. strength.

HANSON McDOWELL,
1522 Monadnock. Chicago.

Larger paid circulation and larger list of advertising patrons than ever in its history. These THE IRON TRADE REVIEW now has. Advertising in it pays.

KENTUCKY FIRE BRICK WORKS,

CUPOLA BRICK.

KENTUCKY FIRE BRICK WORKS, PORTSMOUTH, O. HIGH GRADE FIRE BRICK BEST BLAST FURNACE & ROLLING MILL BRICK

STEEL WORKS BRICK.

FIREBRICK, KY.

PUNCHES AND SHEARS

OF ALL KINDS

MANUFACTURED BY

The Long & Allstatter Co.,

HAMILTON, OHIO.

Send for catalogue.

Fires and Accidents:—

Fire destroyed the blacksmith shop and miners' tools manufacturing plant of Rudolph Mulks at Blair Station, Pa., Jan. 26. Loss, $3,000; insurance, $1,000. The plant will be rebuilt.

The Lackawanna Iron & Steel Co. has had a number of furnace accidents lately. The North Cornwall Furnace is out of blast, the result of an explosion a month ago. Last week the twin Coleman Furnaces, at Cornwall, were considerably damaged. The first explosion occurred at No. 1 Furnace, a weak spot in the big stack above the jacket giving way. At Furnace No. 2, molten iron had eaten its way out of the stack and found an outlet to the pit through the sewer pipe.

Fire at the foundry of W. L. Sharp & Son, Steubenville, O., caused a loss of $7,000 or $8,000, fully insured.

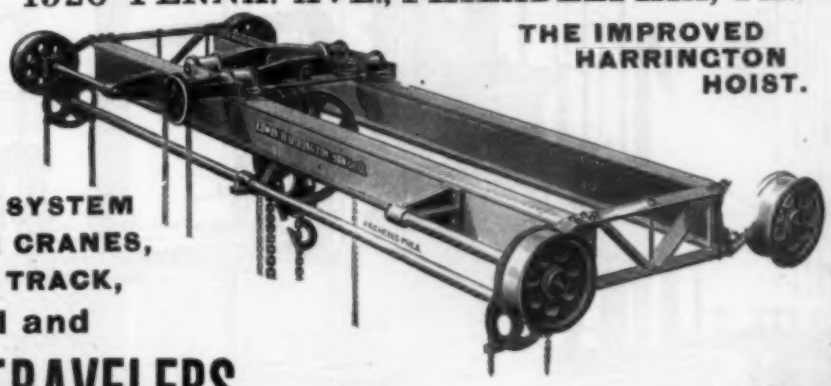
Fire starting in a frame shed under the water tank of the Missouri Car & Foundry Co., St. Louis, burned the shed, the

EDWIN HARRINGTON, SON & CO., Inc.,

DESIGNERS AND MANUFACTURERS OF

ENGINE LATHES, DRILLS, MILLING MACHINES, Etc.

1526 PENNA. AVE., PHILADELPHIA, PA.



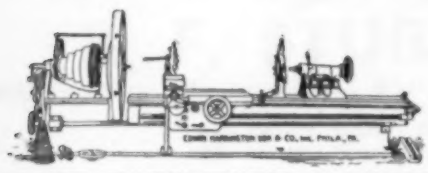
THE IMPROVED HARRINGTON HOIST.

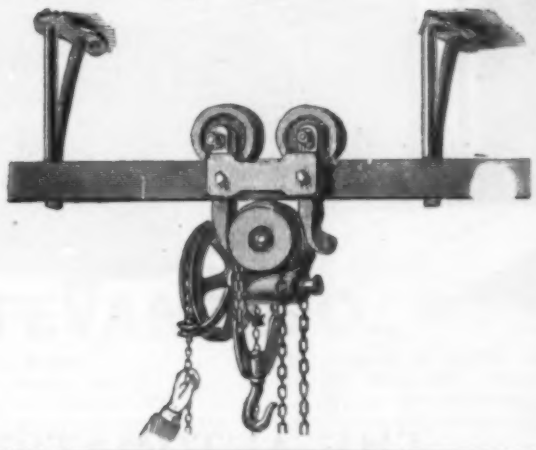
COMPLETE SYSTEM TRAVELING CRANES, OVERHEAD TRACK, Geared and

PLAIN TRAVELERS,

TURN TABLES and SWITCHES.

OUR NEW ELECTRIC HOIST WORKS LIKE A CHARM.





MADE IN PHILA. ONLY.

scaffolding carrying the tank, and scorched the tank. Loss $5,000.

Fire at the Duthie Chain Co.'s works at Indianapolis, Ind., caused $10,000 loss.

General Industrial Notes:—

The Berlin Iron Bridge Co., East Berlin, Conn., has just shipped several carloads of bridge material to the Hawaiian Islands. It is believed this is the first American bridge put up in these islands. The company is doing a large foreign business, having a regular established agency at Honolulu, also one at Guadalajara, Mexico, and at Berlin, Germany. It also has a representative now traveling through Russia.

The Anderson Iron & Bolt Co., Anderson, Ind., elected as directors on Jan. 19 John L. Forkner, John R. Page, Geo. Nichol, T. J. McMahan and A. J. Brunt. The officers are: George Nichol, president; A. J. Brunt, vice-president; John R. Page, secretary, and John L. Forkner, treasurer.

The Corning Steel Co., 938 Monadnock Bldg., Chicago, now has its sheet mills at Hammond, Ind., in good running order, and is turning out both black and galvanized sheets.

It is reported that the Pennsylvania Steel Co. will be able to pay in cash, out of earnings, the March interest on its consolidated mortgage 6s, amounting to nearly $100,000, which last year was paid in scrip, as well as likewise meeting out of earnings the February interest on the Maryland Steel 1st 5s, amounting to $50,000. The company has recently taken considerable foreign business, has much business ahead, and its shipbuilding department, resumed last year, is a source of income that the company has not had for years.

The Low Moor Iron Co., of Virginia, expects to blow in its Covington Furnace at Covington, Va., early in February.

The wages of Virginia iron ore miners are now higher than at any time since 1892.

The Steel Storage & Elevator Construction Co., 308 Guaranty Bldg., Buffalo, originator and patentee of the pneumatic steel fireproof storage tanks and machinery for handling and storing grain, has several plants under construction, and contracts for further work. Its 3,000,000-bushel tanks at Fort William, Can., for the Canadian Pacific Ry., 1,000,000-bushel tanks at Buffalo for the Electric Maine Elevator, and the 1,000,000-bushel tanks built at Toledo, O., for Churchill & Coon are notable examples of successful operations. The company's tank work is done at Warren, O.; the pneumatic machinery is made at Buffalo, and the blowers at Connersville, Ind. The tanks now in operation represent a storage capacity of 8,724,000 bushels. Three hundred men are employed regularly at their different works of the company, and when erecting as high as 800 men have been engaged

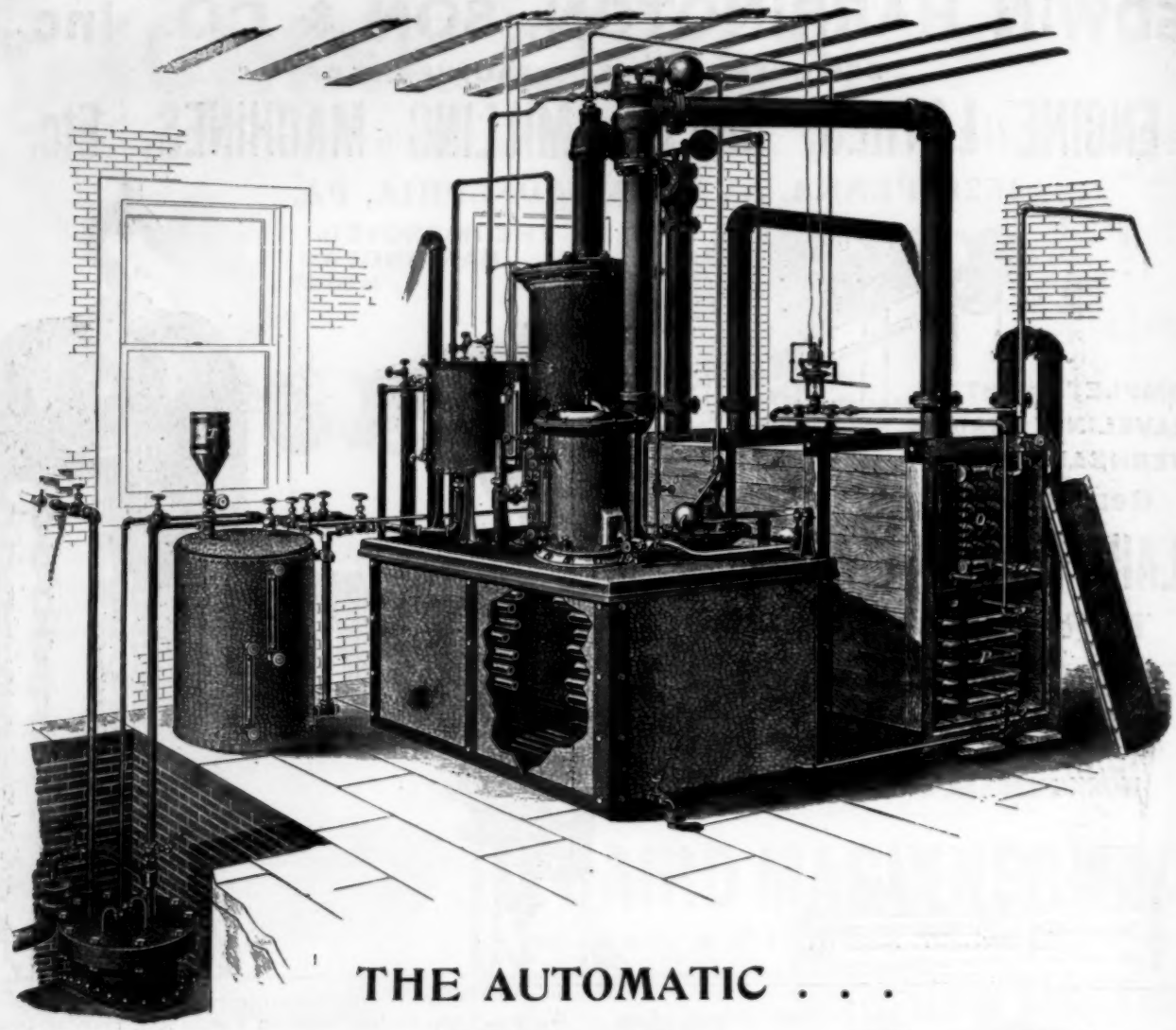
COSTS NO MORE.

To Go East via Washington Over Pennsylvania Lines. Than it does to make the trip to Philadelphia and New York over the direct Pennsylvania route through Harrisburg and Lancaster. Tickets via Washington are good for ten days' stop-over at the National Capital, and at Philadelphia an additional ten days' stop-over may be enjoyed by holders of tickets to New York whether they read via Washington or over the direct route. For special information regarding fares, time of through trains, etc., please apply to local representatives of the Pennsylvania Lines, or address C. L. Kimball, Asst. Gen'l Passenger Agent, Cleveland, O.

SAME VIA WASHINGTON.

Fares to Philadelphia and New York over Pennsylvania Lines.

Tickets to Philadelphia and New York over the Pennsylvania Lines do not cost any more via Washington than via direct route of the Pennsylvania System. Ten days' stop over at the National Capital may be enjoyed by passengers via Washington, and those holding tickets to New York may enjoy an additional ten days' stop-over at Philadelphia. For rates, time of trains, and other particulars, apply to nearest ticket agent of the Pennsylvania Lines, or address C. L. Kimball, Asst. Gen'l Passenger Agent, Cleveland, O.



THE AUTOMATIC . . .

American Oil Gas Machine

GENERATES A PERFECT FUEL GAS from Crude Naphtha at 15 CENTS PER THOUSAND feet, which is unexcelled for all Heating Operations required in Mechanical Work.

We manufacture an extensive line of

Gas Blast Furnaces, Forges, Ovens, Retorts, Kilns, "Automatic Heating Machines," and Positive Pressure Blowers,

And make a specialty of Complete Factory Outfits,

Including Gas Generators and Heating Devices of all kinds.

Examinations and Experimental Work at our own expense. For Catalogues and further information, please address

AMERICAN GAS FURNACE COMPANY,

GAS ENGINEERS AND MANUFACTURERS,

23 John Street, NEW YORK.

A FEW REFERENCES:

The Franklin Institute of Philadelphia. Medal.
The S. S. White Dental Mfg. Co., Philadelphia, Pa.
The Putnam Nail Co., Boston, Mass.
The Pope Manufacturing Co., Hartford, Conn.
The Pope Tube Company, Hartford, Conn.
The Crescent Watch Case Company, Newark, N. J.
The Meriden Britannia Co.
The U. S. Mints and Assay Offices (everywhere).
The Woolwich Arsenal, England.
McGill University, Montreal.
Excelsior Needle Company, Torrington, Conn.
The National Sewing Machine Co., Belvidere, Ill.
The Elgin National Watch Co., Elgin, Ill.
The Sterling Cycle Works, Kenosha, Wis.
Charles S. Platt, Gold and Silver Refiners, N. Y. City.
The O'Hara Waltham Dial Co., Waltham, Mass.
The American Bank Note Company, New York.
The Bureau of Engraving and Printing, Washington.
Stover Bicycle Mfg. Co., Freeport, Ill.
Ames & Frost Company, Chicago.
Ledoux Chemical Laboratory, New York City.
Baker & Co., Gold, Silver and Platinum Refiners,
Columbia University, School of Mines. [Newark, N. J
New York & Ohio Company, Lamp Works, Warren, O.

American Institute highest awards, 4 Medals.

Sturtevant Forges.

Portable and Stationary,

40 Sizes and Styles.

EXHAUST FANS

For Removing Smoke.

Engines,
Motors,
Steam and
Electric Fans,
Steam TRAPS and
Blower System of
Heating and
Ventilation.

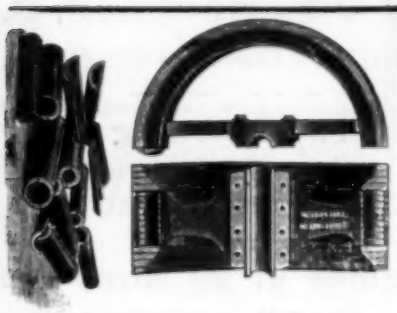
Pressue Blowers for Air Blast.

We Design and Furnish Complete
Outfits for Smith Shops.

SEND FOR FORCE CATALOGUE No. 91.
TYPICAL PLANT FOR FORCED DRAFT.

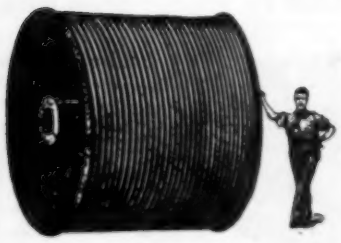
B. F. STURTEVANT CO., Works: BOSTON, MASS.

WAREROOMS: 34 Oliver St., Boston, Mass.
131 Liberty St., New York, N. Y.
16 South Canal St., Chicago, Ill.
135 North Third St., Philadelphia, Pa
75 Queen Victoria St., London, E. C., Eng.
21 W. Nile St., Glasgow, Scotland.
4 Neue Promenade, Berlin, Germany.
2 Kungsholmstorg, Stockholm, Sweden.



INDEPENDENCE WOOD SPLIT PULLEYS.

GRAIN ELEVATOR MACHINERY,
MILL SUPPLIES.

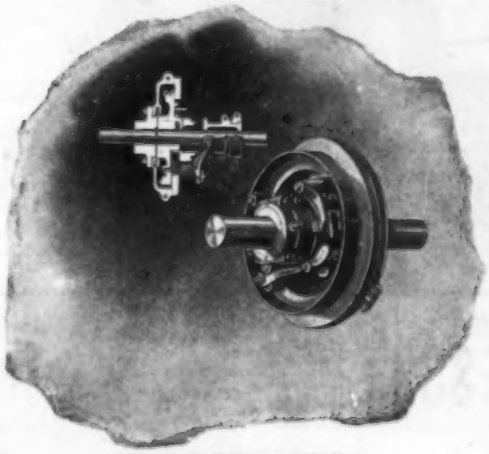


ROPE WHEELS.

DODGE MAN'F'G. CO.

ENGINEERS, FOUNDERS and MACHINISTS.

AMERICAN SYSTEM ROPE TRANSMISSION.



SPLIT FRICTION CLUTCHES.

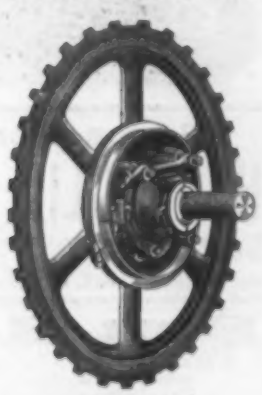
COMPLETE ESTIMATES FURNISHED.

Mishawaka, Ind.

Branch Houses— New York, Boston, Chicago.

IRON CENTER, WOOD RIM
DYNAMO PULLEYS.

BREWERY MACHINERY.



SPROCKETS.

The Encyclopedia of Founding and Dictionary of Foundry Terms

Used in the practice of molding. Together with a description of the tools, mechanical appliances, materials, and methods employed to produce castings in all the useful metals and their alloys, including brass, bronze, steel, bell, iron and type founding, with many original mixtures of recognized value in the mechanic arts. Also aluminum, plating, gilding, silvering, dipping, lacquering, staining, bronzing, tinning, galvanizing, britannia ware, German silver, nickel, soldering, brazing, ores, smelting, refining, assaying, etc. By SIMPSON BOLLAND, author of "The Iron Founder," "The Iron Founder Supplement." 12mo.; cloth; sent postpaid on receipt of price, ... $3.00

THE IRON TRADE REVIEW CO., Chicago. Cleveland, Pittsburg.

Economy is Wealth.

Not the economy that saves at the spigot and wastes at the bung; but the intelligent, enlightened economy that can see two dollars saved in the future by an extra dollar spent now. The use of gears, with properly cut bevel or spur teeth, in preference to gears with cast teeth, illustrates the economy referred to.

Write us for particulars about our business of gear cutting.

R. D. NUTTALL & CO.,
ALLEGHENY, PA.

Gears and Pinions

SPUR GEARS,
SPIRAL GEARS,
BEVEL GEARS,
WORMS and RACKS.

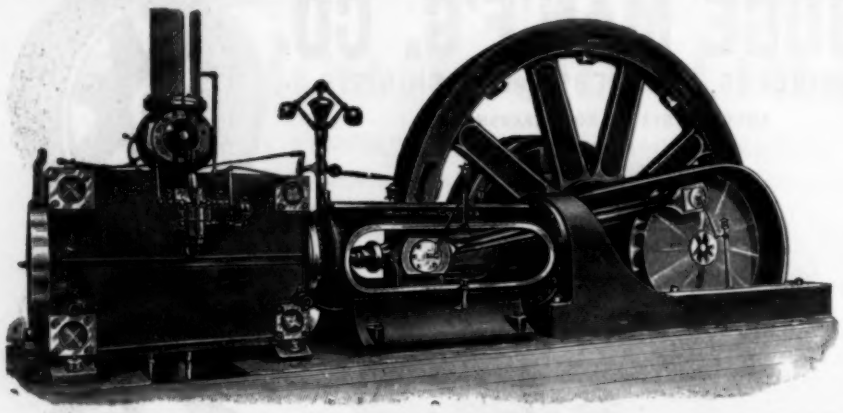
We make Gears of Steel, Malleable Iron, Cast Iron, Brass and Rawhide, and furnish them complete or cut as desired.

Gear Cutting of all Descriptions.

Material and workmanship the best.
Write us for estimates and prices.

THE VAN DORN & DUTTON CO.,
1796 East Madison Ave., Cleveland, Ohio.

THE HOOVEN, OWENS & RENTSCHLER CO., Hamilton, O.



Hamilton Corliss Engines.

Engines for Rolling Mills Electric Railways and Electric Light.

Engines of all Sizes and for all purposes.

46 South Canal St., CHICAGO.
39 and 41 Cortlandt St., NEW YORK.
Lewis Block, PITTSBURGH, PA.
Room A, Laclede Building, ST. LOUIS, MO.
C. C. MOORE & CO., SAN FRANCISCO, CAL.

60-ton, Portable

HYDRAULIC PRESS,

For pressing on Cranks, Crank Pins, Sheaves, Car Wheels, etc. Labor saving. Only $150.00.

VULCAN IRON WORKS, 49 Milwaukee Ave., Chicago.

FOR SALE.

At a great sacrifice, by order of Courts, to satisfy a mortgage, about 9,000 acres of land rich in

Iron Ore, Manganese, Clays, Ochres, Umber, Sand, Building Stone, Hydraulic Cement Rocks, Limestones, Marl, Lime, Fine Farming Lands, Forests, and Water Power.

Good railroad facilities by two competitive roads. Cheap coal and coke. Apply for full report, analyses, maps, price, etc., to

JNO. STEWART WALKER, Court's Agt., Lynchburg, Va.

B.F.S.Co's

Flasks

are

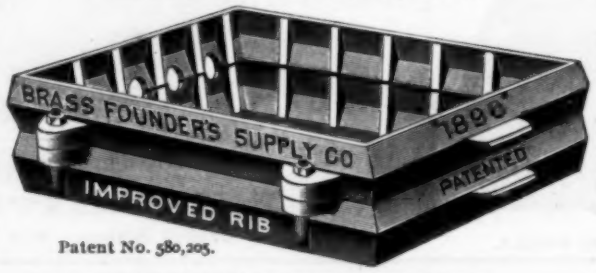
All Right

so

Are Prices.

Send for catalogue if interested.

LATEST AND BEST.



Patent No. 580,205.

BE SURE YOU GET THE RIB.

Selling Agents
FOR
Brass Founders Supply Co.:
THE
S. Obermayer Co.
Cincinnati and Chicago.
J. W. Paxson Co.
Philadelphia, Pa.
J. S. McCormick Co.
Pittsburgh, Pa.

BRASS FOUNDERS' SUPPLY CO., Newark, N. J.

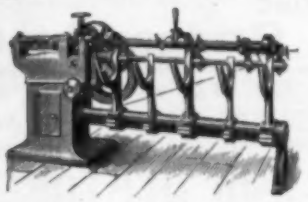
BRASS FOUNDERS FINISHERS J. J. RYAN & CO.

68 to 74 West Monroe St., Chicago.

Best Bronze, Babbitt Metals, Brass and Aluminum CASTINGS On Short Notice.

By the use of this machine, wire is straightened and

CUT AT THE RATE OF 60 TO 90 FEET PER MINUTE,



Automatic Wire-Straightening and Cutting Machine.

Direct from the coil, from one (1) inch up to any desired length. Prices range from $135.00 up. Write for catalogue, information, etc., designs samples of wire used.

JOHN ADT & SON.

F. B. Shuster, Prop.

NEW HAVEN, CONN.

BUILDERS OF

Roll any Rotary Wire-Straighteners, Automatic Wire-Straightening and Cutting Machinery, Riveting Machines, Special Automatic Machinery, Etc.

Do You Want an - - -

Automatic Machine Built ?

Or any kind of Wire or Sheet Metal Machinery built? If so, write

A. H. NILSON MACHINE CO.
Bridgeport, Conn.

PYROMETERS

Edward Brown,

ESTABLISHED 1866.

311 WALNUT St., PHILADELPHIA.

Manufacturer and Patentee

OF THE

Hot Blast (or Graphite) Pyrometer.—The only stationary Pyrometer now in use durable over 700 degrees.

The Standard Portable Pyrometer—For Blast Furnaces.

Mercury Revolution Indicator.—Centennial Exhibition Medal. Accurate for all time.

Annealing Oven Pyrometer—to 3,000 degrees—of 1893.

Tin-plating Pyrometer—of 1894.

Mercury and Steam Gauges.

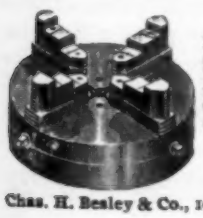
MACHINERY FOR REDUCING AND POINTING WIRE

By Compression or Cold Swaging.

Especially adapted to Pointing Wire Rods and Wire for Drawing. For machines or information, address:

S. W. GOODYEAR.

Waterbury, Conn.



SKINNER CHUCKS.

Independent and Universal Chucks, Combination Lathe Chucks, with pt. reversible jaws, Drill Chucks, Planer Chucks and Face Plate Jaws.

Send for Catalogue.

SKINNER CHUCK CO.
New Britain, Conn.

Chas. H. Besley & Co., 10 N. Canal St., Chicago, Ill.

ARMSTRONG MAN'F'G. CO.

CATALOGUES ON APPLICATION.

WATER GAS AND STEAM FITTERS TOOLS

BRIDGEPORT, CONN.

New York Office, 139 Center Street.

The well merited reputation attained by our goods is our guarantee of their superiority. If you cannot get them of your dealer send to us for catalogue and prices.

ENGRAVINGS FOR CATALOGUES A SPECIALTY

FINE ARTISTIC ENGRAVINGS

The National Engraving Co.

OF ALL KINDS AT LOWEST PRICES

204 SUPERIOR ST.

Cleveland O.

ELECTROTYPES AND WOOD ENGRAVING

DESIGNS FURNISHED

LEVIATHAN

Belting

Is the strongest, runs the most evenly, and best adapted for Cotton, Woolen, Saw and Planing Mills, Brick and Tile Works and

Heavy Driving Generally.

MAIN BELTING CO.

1219-1235 Carpenter Street.
PHILADELPHIA.

120 Pearl Street,
BOSTON.

55 & 57 Market St.,
CHICAGO.

IT PAYS
To advertise in the Iron Trade Review.

WE NEEDED

MORE ROOM

For increased Trade and Stock and have added No. 8 South Water St. to our salesrooms.

Cleveland Tool & Supply Co.

Punches, Dies, Metal Stamping

IN

STEEL, BRASS, COPPER, ALUMINUM, GERMAN SILVER, ETC.

Send sample or sketch for prices. Novelties and patented articles made by contract.

E. KONIGSLOW & BRO.,
310-312 Seneca St., Cleveland, O.

Brainard Milling Machine Co.

WORKS AT

HYDE PARK, MASS.

THE

W. M. Pattison Supply Co.
277-287 St. Clair St.,
Agents for Cleveland and vicinity.

A B C OF IRON,

NOW $1.00.

SHEET AND **BLACK PLATE BARS.** All Sizes of **MERCHANT BAR.**

SOFT STEEL BARS BILLETS SHEETS TIN & TERNE PLATE

Light Rails, Hexagons, Channels, Angles, Tees & Special Shapes

Black, Painted, Galvanized— Sheets, Plain and Formed.— Corrugated,— Crimped & other forms of ROOFING.

COMMON AND **SPECIAL SHEETS.** Tin and Terne Plate In All Grades.

ÆTNA-STANDARD IRON & STEEL CO., Bridgeport, O.

THE BOURNE-FULLER CO.,

Pig and Bar Iron,

CLEVELAND, . OHIO.

Oglebay, Norton & Co.,

LAKE SUPERIOR IRON ORES.

— AGENTS —

The Spanish-American Iron Co., Santiago, Cuba.

CLEVELAND. PHILADELPHIA.

M. A. HANNA & CO.

IRON ORE,

PIG IRON AND COAL.

CLEVELAND, OHIO.

McKEEFREY & CO.,

PIG IRON, COAL AND COKE.

LEETONIA, OHIO.

THE OHIO STEEL COMPANY,

MANUFACTURERS OF

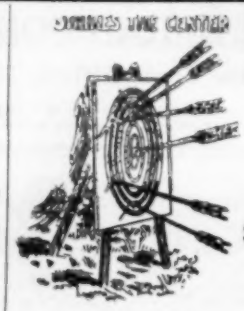
Steel Rails, Billets,

Sheet and Tin Plate Bars,

YOUNGSTOWN, OHIO.

BERGER'S METAL CEILINGS

Deepest stamped. Most artistic. The only ones in Classified Designs. Write to-day for details. THE BERGER MFG. CO., Canton, O.



BECAUSE NOTHING BUT THE BEST MATERIAL IS USED "HONESTY IS THE BEST POLICY." TO MAKE GOOD CASTINGS, USE THE BEST IRONS.

CLINTON AND HECTOR

Inspected Foundry Irons

—FOR—

SOFTNESS, STRENGTH, FLUIDITY, UNIFORMITY.

MANUFACTURED BY

CLINTON IRON & STEEL CO.

FURNACES: Pittsburgh, Pa. NEW YORK OFFICE: No. 15 Cortlandt St.

CLEVELAND ROLLING MILL CO.,

CLEVELAND, - OHIO,

—MANUFACTURERS OF—

BESSEMER AND OPEN-HEARTH STEEL,

Blooms, Billets, and Slabs, Steel Rails, Steel Beams, Channels and Angles. Steel Forgings, Bar Spring, and Sleigh Shoe Steel. Steel Wire of all kinds. Barbed Wire, Iron and Steel Plates, Galvanized and Black Sheet Iron and Steel Corrugated Iron Roofing.

LAKE SUPERIOR CONSOLIDATED IRON MINES.

HIGH GRADE MISSABE ORES.

Adams, Ainslie, Duluth, Hibbing, Hartley, Linwood and Pillsbury Mines.

OGLEBAY, NORTON & CO., Sales Agents - Cleveland, Ohio.

E. A. DELANO,

50 to 52 So. Clinton St., Chicago.

MANUFACTURER OF

SHAFTING, PULLEYS & HANGERS.

A Large Stock Constantly on Hand.

CORRESPONDENCE SOLICITED.

J. J. MOREHOUSE, PRES'T & TREAS.

The Salisbury Carbonate Iron Co.

MANUFACTURERS OF

SUPERIOR QUALITY CHARCOAL CARBONATE & SALISBURY

PIG IRON.

Suitable for CAR WHEELS, CANNON, CHILLED ROLLS, MALLEABLE CASTINGS.

Made from AMENIA & SHAKER HEMATITES & CALCINED CARBONATE ORES.

FURNACES! THE LANDON, CHAPINVILLE, CONN. CHATHAM, CHATHAM, N.Y. COPAKE IRON WORKS, N.Y.

STRONGEST CAST IRON IN THE WORLD FOR GUN IRON CASTINGS & GUN CARRIAGES.

OFFICE 93 & 95 NASSAU STREET, NEW YORK.

This Carbonate Iron is especially adapted and used largely in the manufacture of gun iron and gun castings for the U S. Navy. Government tests show the iron in the pig to stand from thirty-five thousand to forty-two thousand nine hundred pounds tensile strength. We solicit correspondence and full information.

THE 1898 EDITION OF THE **Iron and Steel Directory**

Published by The American Iron and Steel Association.

Will be sent postpaid by *The Iron Trade Review* at $7. Ready now.

Is a thorough revision of the list of blast furnaces, rolling mills, Bessemer and Open-Hearth steel works, plate and sheet mills, nail mills, tin plate mills, malleable, cast iron pipe and wrought pipe works, car wheel and locomotive works, with many new lists of works in other lines.

FOR CAR WORK

and all malleable work there are no stronger or more satisfactory irons than

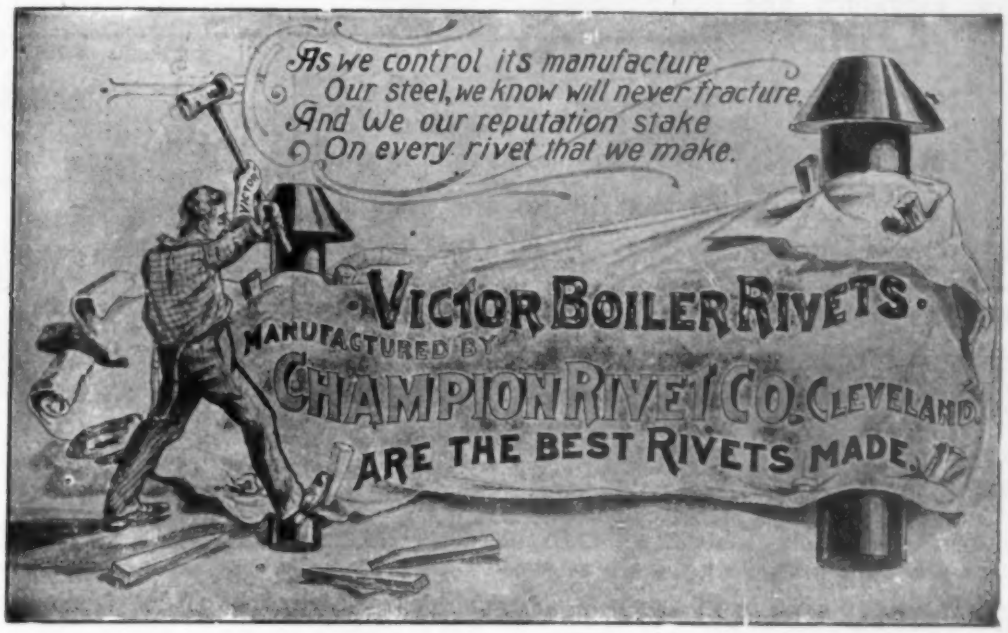
"Pioneer," "Antrim," "Elk Rapids"

LAKE SUPERIOR CHARCOAL IRON.

Superior Charcoal Iron Co.,

911, 912, 913 Michigan Trust Bldg.,

GRAND RAPIDS, MICH.


As we control its manufacture
Our steel, we know will never fracture.
And We our reputation stake
On every rivet that we make.
VICTOR BOILER RIVETS
MANUFACTURED BY
CHAMPION RIVET CO. CLEVELAND
ARE THE BEST RIVETS MADE.

HEBER WELLS,
Pattern Letters.
For Iron and Brass Castings.
Various Sizes and Styles. . .
159 William St., New York.

ESTABLISHED 1854.

PETER GERLACH & CO.,

MAKERS OF

Saws, Tools and Machinery.

Office and Warerooms, 28 Columbus St.
Factories on Columbus, Winter and Leonard Sts.

Cleveland, Ohio, U. S. A.

Persistence In Advertising

Is one of the requisites of satisfactory results. In the expansion of business which is now noticeable in every section of the country, advertisers who have made themselves regularly prominent in the past two years will be first to reap the rewards of persistent publicity.

J. M. ALLEN, President.

WM. B. FRANKLIN, Vice-President.

F. B. ALLEN, Second Vice-President.

J. B. PIERCE, Secretary and Treas.

HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO.
HARTFORD, CONN.

BURWELL & BRIGGS, General Agents, 32 and 33 Clark Bldg., 208 Superior St., Cleveland, O.

C. A. BURWELL, Chief Inspector, 32 and 33 Clark Bldg., 208 Superior St., Cleveland, O.

J. R. WOLCOTT, Special Agent, 32 and 33 Clark Bldg., 208 Superior St., Cleveland, O.

A large and growing circulation among machine shop and foundry firms has

THE IRON TRADE REVIEW.

Mines or prospects operated on contract to purchase, or under lease on fixed royalty or percentage. MONEY loaned, mines, MINING companies organized, their property exported, financed and managed; MINES, prospects, mineral lands, mining securities, contracts, bonds, stocks, leases and options bought and sold or negotiated; EXAMINE mines, prospects and mineral lands as to their value, method of working and condition of their titles. Assay and chemical work done.

EDW. N. BREITUNG, Marquette, Mich., U. S. A.

Cable address, Edbeo. Codes, Lieber's Bedford, McNeil's, A B C Universal Commercial.

THE FARREL (Blake Pattern, Ore and Rock.)

- - - CRUSHER.

STANDARD OF THE WORLD.

Farrel Foundry and Machine Co.,

EARLE C. BACON, Engineer,

Havemeyer Bldg., NEW YORK.

When writing to advertisers please mention The Iron Trade Review.

THE READING STANDARD BLOCK.

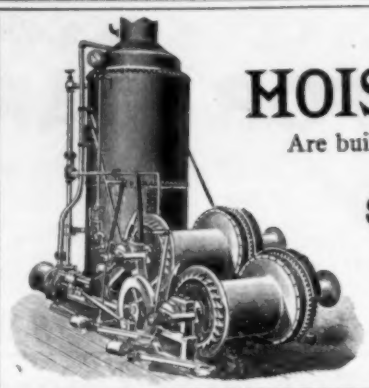
PATENTED,

This is the latest addition to our line of Chain Blocks. It is high in efficiency, has an adjustable automatic brake sustaining the load at any point of the lift, hoists and lowers rapidly, and being light and compact, can easily be taken from place to place.

TRAVELING CRANES. OVERHEAD TRACKS, ETC.

Reading Crane & Hoist Wks.,

Reading, Pa.



LIDGERWOOD

HOISTING ENGINES

Are built to Gauge on the Duplicate Part System.

QUICK DELIVERY ASSURED.

STANDARD For Quality and Duty.

Steam and Electric HOISTS.

LIDGERWOOD MFG. CO.,

96 LIBERTY STREET, NEW YORK.

Chicago, Portland, Ore. Cleveland, Boston, Philadelphia, New Orleans.

LINK-BELT . .

Elevators and Conveyors,

Malleable Buckets, Steel Ash Cars, Shafting, Pulleys, Bearing, Rope Sheaves, etc.,

Link-Belt Machinery Co.

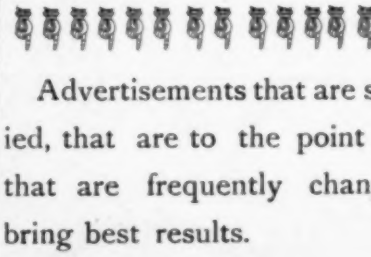
Engineers, Founders, Machinists. . . .

CHICAGO, U. S. A.

Link-Belt Engineering Co.

Phila. and New York.

The Chemical Analysis of Iron, $4.00.



THE BUCYRUS COMPANY,

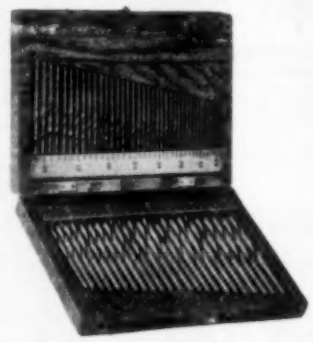
DESIGNERS AND BUILDERS OF

Dredges, Steam Shovels, Excavating Machinery, Steam and Electric and Locomotive Cranes, Centrifugal Pumps, with Simple, Compound or Triple Expansion Engines, Pile Drivers, Wrecking Cars, Placer Mining Machines.

SOUTH MILWAUKEE, WIS.

Advertisements that are studied, that are to the point and that are frequently changed, bring best results.

S. H. Stupakoff's TWIST DRILL CASES.



Combines Drill Case and Drill Gauge. Is handy and neat in appearance. Occupies the smallest possible space. Can be carried in the pocket. Can be placed in a low drawer of tool box. Missing drills are detected at a glance. No hunting for certain sizes of drills.

VULCAN MFG CO., Ltd., Pittsburg, Pa. Station D.

THE BROWN HOISTING AND CONVEYING MACHINE CO. CLEVELAND, O.

MACHINERY FOR HANDLING COAL AND ORE.

CRANES

ELECTRIC, STEAM AND HAND POWER CRANES OVERHEAD TRAM RAILS

BILLET AND SLAB CONVEYORS,

BAR IRON CONVEYORS,

MECHANICAL BOSHES.

Complete plants designed and erected with guaranteed results.

Labor-Saving Devices and Conveying Machinery of All Kinds.

HEYL & PATTERSON, Pittsburg, Pa. **Office: 108 Market St.**

FOUR-NIGHT.

Cleveland Union Station.

Pennsylvania Lines.

Foot of Bank Street.

TICKET OFFICES at Station, Euclid Av., Woodland Av., and Weddell House corner.

THROUGH TRAINS RUN AS FOLLOWS BY CENTRAL TIME

*Daily. †Daily except Sunday.

xDaily except Saturday. ‡Saturdays only.

FROM CLEVELAND TO	LEAVE	ARRIVE
Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	† 3:15 pm	† 6:25 pm
Philadelphia and New York	* 2:10 pm	*11:30 am
Baltimore and Washington	* 2:10 pm	*11:30 am
Alliance and Pittsburgh	* 2:10 pm	*11:30 am
Ravenna and Alliance	* 5:00 pm	* 8:45 am
Philadelphia and New York	*11:10 pm	* 4:30 am
Baltimore and Washington	*11:10 pm	* 4:30 am
Alliance and Pittsburgh	*11:10 pm	* 4:30 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Columbus and Cincinnati	* 8:35 am	* 5:40 pm
Indianapolis and St. L.	* 8:35 am	* 5:40 pm
Millersburg and Akron	† 3:15 pm	†12:10 pm
Col., Cin., Ind. & St. L.	x7:40 pm	*7:30 am
Col., Cin., Ind. & St. L.	‡11:20 pm	*7:30 am

BIG FOUR ROUTE

The Popular Line.

CHICAGO

TO

Indianapolis,

Cincinnati,

Louisville

AND ALL POINTS

SOUTH AND SOUTHEAST.

The scenic line to

WASHINGTON, via C. & O. Ry.

The direct line to ASHEVILLE, N. C.

J. C. TUCKER, G. N. A., 234 Clark St., CHICAGO.

COVERT MFG. CO.

West Troy, N. Y.

Steel Carriage and Wagon Jacks, Harness Snaps, Chain, Rope and Webb Goods, Etc.

For Sale by Jobbers at Manfrs. Prices.

Press Clippings.

If you want THE BEST THINGS printed on any particular subject or ALL that is published about it everywhere, YOU CAN GET IT FROM US. Clippings mailed daily.

We read practically every newspaper and periodical that is published. Business men and others find our service very valuable to them. Rates, $1 per month and upwards.

Write for particulars.

The Chicago Press Clipping Bureau,

66 Fifth Avenue, CHICAGO

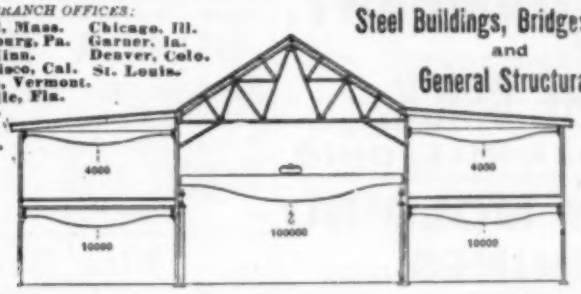
Molders' Text Book, Price $2.50.

PERFORATED METALS.

PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.
LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.
THE ROBERT AITCHISON.
PERFORATED METAL CO.,
OFFICE, ROOM 510 265 TO 269 DEARBORN STREET, CHICAGO, ILL. WORKS SOUTH CHICAGO.

BRANCH OFFICES:
Springfield, Mass. Chambersburg, Pa. St. Paul, Minn. San Francisco, Cal. Burlington, Vermont. Jacksonville, Fla. Louisville, Ky. Spartanburg, S.C. Chicago, Ill. Garner, Ia. Denver, Colo. St. Louis.

Steel Buildings, Bridges and General Structural Work.



PITTSBURG BRIDGE COMPANY,
PITTSBURG, PA.

STEEL CONSTRUCTION
IN ALL BRANCHES.

BUILDINGS DESIGNED AND ERECTED IN ALL PARTS OF THE WORLD.

Roof Frames and Trusses,
Blast Furnaces and Steel Works,
Cupolas, Ladles, Converters,
Boilers, Tanks and Heavy Plate Work

RITER-CONLEY MFG. CO., PITTSBURG, PA.

JEFFREY

Roller, Steel and Special Chains.

ELEVATORS

—AND—

CONVEYORS

FOR HANDLING MATERIAL OF ALL KINDS.

WIRE CABLE CONVEYORS. For long and short distance conveying.

THE JEFFREY MFG. CO. Columbus, Ohio.

41 DEY STREET, NEW YORK.

Send for Catalogue.

SHIFFLER BRIDGE COMPANY,
BUILDING DEPARTMENT.

SPECIALTIES: Steel and Iron Buildings for Rolling Mills, Tin Plate Plants, Steel Works, Foundries, Factories, Roof Trusses, Girders, Columns, Beams, Corrugated Iron, Etc.

Main Office and Works:
48th Street and A.V. Ry., PITTSBURG, PA.

Branch Offices:
1214 Betz Building, Philadelphia, Pa.
45 Broadway, New York, N. Y.
728 Lumber Exchange, Minneapolis, Minn
Marquette Building, Chicago, Ill.

MAPS
FOR READY REFERENCE.

The Chicago, Milwaukee & St. Paul Railway Co. has just issued in convenient form, for household, library and school reference, an atlas of seven colored maps of the world, the United States and our new possessions in the Atlantic and Pacific Oceans, together with an amount of valuable information connected therewith—all up to date. This atlas will be sent free to any address on receipt of six (6) cents in postage.

Apply to Geo. H. Heafford, General Passenger Agent, Old Colony Bldg., Chicago.

Just Ready!

SECOND EDITION

OF

Chemical and Metallurgical

HANDBOOK

CONTAINING

Tables, Formulas and Information for the use of Chemists, Metallurgists and Mining Engineers. . . . . .

BY

J. H. CREMER, M. E.,

AND

G. A. BICKNELL, M. S.

EXTRACT FROM PREFACE:

In the preparation of the second edition of our Handbook, the general plan of the first edition has been followed, viz, to present in concise form such data and information as are useful to the chemist and metallurgist. Several tables of the first edition, which were of somewhat limited use, have been omitted, while more than one hundred pages of new matter have been added.

The methods for analysis of iron ore, iron and steel and for assaying have been given briefly, but perhaps as much in detail as is consistent with the general scope of the book. Several changes and additions to the Specific Gravity tables have been made by adoption of later and more accurate values.

In the notes on blast furnace practice have been outlined the more important theoretical and practical points, which, it is hoped, will be of some service to those interested in the manufacture of iron.

The hygrometric table gives the necessary information for determining the amount of moisture in air, a subject whose importance in metallurgical operations is being more fully recognized at present than heretofore. This table is new and is based on the most accurate data available at the present time.

The tables of weights and measures, United States and foreign, have been very much amplified, and the conversion tables for United States and metric weight and measures of the U. S. Coast and Geodetic Survey included, the latter being based on the legal standard for this country.

Numerous miscellaneous tables have been added, which, it is hoped, will be found of value

Seal Morocco, - - $3.00

Sent postpaid on receipt of price by

The Iron Trade Review Co.,

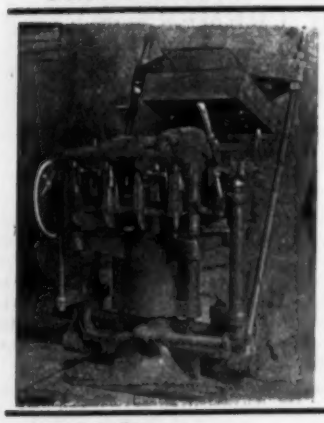
CHICAGO, CLEVELAND, PITTSBURG.

THE "CLEARFIELD" FIRE BRICK
MANUFACTURED BY
THE CLEARFIELD FIRE BRICK CO., Limited,
Office and Works at CLEARFIELD, PA.
Room 305 Ferguson Bldg., Pittsburg, Pa., John Richardson, Agent.

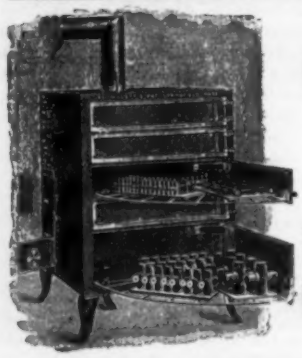
FIRE DOVER FIRE BRICK CO., MANUFACTURERS OF Furnace, Mill and Special Shape Fire Brick. Office, 44 Mercantile Bank Bldg., CLEVELAND, OHIO. **BRICK**

FIRE BRICK For All Purposes.
CHICAGO FIRE CLAY PRODUCT CO.,
518 Chamber of Commerce, CHICAGO, ILL.

ÆTNA FIRE BRICK COMPANY,
Manufacturers of the Celebrated
ÆTNA HIGH GRADE FIRE BRICK,
Office and Works: OAK HILL, OHIO



FOUNDRY MOLDING ...MACHINES...
Stripping Plate Machines Operated by Steam or Compressed Air.
Our new air power vibrator machine gives all the advantages of stripping plate work, without the cost of stripping plates.
Write us about low cost of pattern installation. Wood or metal patterns used.
THE TABOR MFG. CO., Elizabeth, N. J.



Millett's Patent Portable
Core Oven
All complete and ready to put the fire in.
No one who makes small cores can afford to be without it. . .
DOUBLE DOORS.
One closing the oven when the other is open.
Saves Fuel, Saves Time.
Send for Circular.
MILLETT CORE OVEN CO., Brightwood, Mass.
The Core Ovens may be seen in the sample rooms of The S. Obermayer Co., either in Cincinnati or Chicago. J. W. Paxson & Co., Philadelphia, Pa.

JAMES IRWIN & Co..
MANUFACTURING CHEMISTS,
343 Sixth Ave., Pittsburgh, Pa.
Hydrofluoric Acid for Cleaning Castings.
SOLE AGENTS FOR
Kentucky Fluor Spar Co.'s
High Grade FLUOR SPAR FLUX (containing 94 to 98 per cent Fluoride of Calcium), for Open-Hearth Steel Works and Iron Foundries. Also pure White ground Fluor Spar for Enamelers.

FIRE BRICK
Holmes, Strachan & Co.,
Manufacturers and Shippers
Steel
Savage Mountain
Holmes
Best made for Malleable Rolling Mill Furnaces and Cupola Linings.
DETROIT, MICH.

THE
S. OBERMAYER COMPANY, Cincinnati, O. Chicago, Ill. Larimer, Pa.
MANUFACTURERS OF
Foundry Facings,
Foundry Supplies,
Foundry Equipments.
IMPORTERS AND REFINERS
East India Plumbago, Silver Leads and Graphite.
Estimates given on complete Brass & Iron Foundries. Send for Catalogue No. 26.

SILICA BRICK
For Iron and Steel Furnaces, Glass Furnaces, etc.
SPECIAL SHAPES MADE TO ORDER.
DIAMOND FIRE BRICK WORKS,
AKRON, OHIO.

Fire Brick, Cupola Blocks, Molding Sand and General Foundry Supplies
OF THE HIGHEST GRADE ONLY.

THE GARDEN CITY SAND CO.,
1201-1202-1203 Security Bldg., Chicago.

TRADE MARK SCIOTO
"Royal Star" and "Scioto Star"
High Grade FIRE BRICK.
Best for Rolling Mills, Blast Furnaces, Foundries, etc. High grade Plastic and Flint Clays for all refractory purposes at favorable prices.
The Scioto STAR Fire Brick Works,
PORTSMOUTH, OHIO.
Send for Catalogue.
Established 1871.
Incorporated 1876.

THE **COLUMBIA FIRE CLAY CO.**
MINERS AND SHIPPERS OF
--- High Grade Plastic Clay. ---
Adapted for all service requiring high refractory qualities. Office,
412 Cuyahoga Building, CLEVELAND, O.

The consolidated Iron Trade Review and Industrial World—the leading Machinery, Foundry and Iron and Steel paper west of New York City.

P. G. COCHRAN, President.
J. H. WURTZ, Secretary.

J. R. LAUGHREY, Treasurer.
J. S. NEWMEYER, Manager.

WASHINGTON COAL & COKE CO.

3,500 Acres of Coal.

5,000 Tons Daily Capacity. 350 Individual Coal and Coke Cars.

YOUGHIOGHENY COAL
For Steel Works, Rolling Mills, Tin Plate Works, Locomotive Fuel, etc.

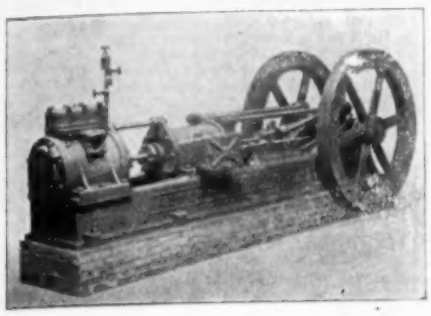
COKING COAL
For Bee Hive or By-Product Ovens.

Our WASHINGTON COKE

Is unsurpassed for uniform purity and general satisfaction in **Blast Furnace and Cupola Practice.** Quality and prompt attention to shipments insure us the preference.

General Office,
DAWSON, FAYETTE CO., PA.

Sales Office, Pittsburg, Pa.
N. P. HYNDMAN, Sales Agent.



Air Compressors
for Air Lift Well Pumping.

Air Compressors
for Rock Drills, Coal Cutters, Air Hoists and Pneumatic work generally.

Pressure Pumps
for Cotton Oil Mills and Cotton Compressors.

Steam Pumps,
Single and Duplex, of all sizes and for all purposes.

Duplex and Triplex POWER PUMPS.

CORRESPONDENCE SOLICITED.

HALL STEAM PUMP COMPANY, Pittsburg, Pa.

Weddell House
Cleveland, Ohio.
THE U.S. HOTEL CO.
C.A. SWAN & W.L. BATES
MANAGERS

50 ROOMS AT $2.00
50 ROOMS AT 2.50
75 ROOMS AT 3 TO 4.00
All Meals
50¢ Each

UNIFORM ANNEALING

Is being done where the

PNEUMATIC PYROMETER

Is used.

SOLD UNDER GUARANTEE.

WE INVITE CORRESPONDENCE.

UEHLING, STEINBART & CO., Ltd.,
40-42 Fourth St., CARLSTADT, N. J.

NEW YORK TRIBUNE.

Recognized as a Leader of Republican Opinion.

The New York Tribune offers to the public a newspaper which is absolutely representative of the best opinion of the Republican party on all national issues. It is dignified, strong, complete and patriotic.

The Daily Tribune is $10 a year. The Weekly, $1, but can be obtained, in conjunction with various local papers, on more advantageous terms. The Semi-Weekly is $2 a year.

A Newspaper and Magazine both.

The Semi-Weekly Tribune, printed Tuesdays and Fridays, is one of the best general newspapers in the country for a wide-awake farmer, professional man, merchant, manufacturer or mechanic. It saves the necessity of buying other newspapers. It supplements admirably a local daily; many people take it in place of one.

The agricultural page will contain this year, in addition to regular features, a weather review, many descriptions of the actual results obtained on small farms, and other matters of particular use to gardners, fruit-growers, farmers, dairymen and live-stock raisers.

Stories of the War with Spain.

During each week the reader will find a column of "Questions and Answers," letters from correspondents in London and Paris; a page devoted to science and mechanics; home interests and other things which interest women, including the "Tribune Sunshine Society;" some good games of checkers; a series of thrilling stories of actual experiences in the war with Spain, written by soldiers and sailors; and advance information of new enterprises of importance to manufacturers, mechanics and business men.

Market Reports the Standard.

The market reports will be kept up to their present high standard. It is the intention of The Tribune at all times to add to them whatever quotations will render them of greater value. The finest compliment paid to The Semi-Weekly Tribune is the fact that it enjoys the subscription of a large number of merchants, dairymen and farmers who disagree with its political sentiments, but who find its accurate market reports essential to the proper conduct of their business. It is always safe to look at The Tribune before one buys or sells country produce. Once a week there is a special market article on one particular topic.

Pictorial Supplement.

With Friday's number there is an Illustrated Supplement 20 to 24 pages, printed on specially fine paper, full of delightful reading, enlivened with from thirty to fifty half-tone or other pictures. Every reader admits that this Supplement is equal to a magazine in its contents, and better than a magazine in being quicker to lay before its readers perfectly fresh discussions of matters which are attracting attention. Sample copies of Friday's issue will be sent free on application. The Supplement contains two pages of humor; a fascinating letter from Ex-Attaché, a gentleman who has served at many of the great courts of the world, and who speaks of kings, emperors and noblemen from actual knowledge; book reviews; short stories; dramatic and musical criticisms; the fine work of great architects and artists; letters from abroad; talk on scientific subjects, new warships, etc.; gossip by pungent writers; and, in fact, the whole range of higher topics in which intelligent men and women are deeply interested, and a profusion of beautiful illustrations. The Supplement is the cream of the whole week's work in The Tribune office.

Clubs.

Any reader who may find it convenient to raise a club of subscribers for The Semi-Weekly Tribune is invited to do so, and to send to this office for sample copies, etc.

THE TRIBUNE.

The Iron Founder

A comprehensive treatise on the art of molding, including chapters on core making, loam, dry sand and green sand molding, also crystallization, shrinkage and contraction of cast iron and a full explanation of the science of pressures in molds, added to which are formulas for mixtures of iron, tables, rules and miscellaneous information. By SIMPSON BOLLAND. Illustrated with over 300 engravings. 12mo.; cloth $2.50

Sent, postpaid, on receipt of price, by

The Iron Trade Review Co.,

CHICAGO. CLEVELAND. PITTSBURG.

"Metallurgy of Cast Iron,"
Price $3.

BUYERS' DIRECTORY.

Air Compressors—
Edw. P. Allis Co., Milwaukee, Wis.
Rand Drill Co., Chicago, Ill.
The Lane & Bodley Co., Cincinnati, O.
Clayton Air Compressor Works, New York.
Ingersoll-Sargent Drill Co., New York.
Hall Steam Pump Co., Pittsburg, Pa.

Air Lift Pumps—
Clayton Air Compressor Works, New York.
The Ingersoll-Sergeant Drill Co., New York.

Analytical Chemists—
Dickman & MacKenzie, Chicago, Ill.
F. A. Emmerton, Cleveland, O.
O. Textor, Cleveland, O
Wellman Seaver Engineering Co., Cleveland, O
The Robert W. Hunt & Co., Chicago, Ill.
Benedict Crowell, Cleveland, O.
John T. Jones & Co., Chicago, Ill.
James Irwin & Co., Pittsburg, Pa.
J. Blodgett Britton & Co., Warrenton, Va.

Annealing Boxes—
Meehan Boiler & Construction Co., Lowellville, Ohio.

Anti-Friction Metal—
C. H. Besly & Co., Chicago, Ill.
North American Metalline Co., Long Island City, N. Y.
Wm. Cramp & Sons, Philadelphia, Pa.
Swarts Metal Refining Co., Chicago, Ill.

Automatic Machinery—
A. H. Nilson Machine Co., Bridgeport, Conn.

Babbitt Metal—
C. H. Besly & Co., Chicago, Ill
Swarts Metal Refining Co., Chicago, Ill.

Bar Iron and Steel—
Ætna-Standard Iron & Steel Co., Bridgeport, O.
Bourne-Fuller Co., Cleveland, O.

Bearing Metal—
C. H. Besly & Co., Chicago, Ill.
North American Metalline Co., Long Island City, N. Y.
Swarts Metal Refining Co., Chicago, Ill.

Bellows—
The S. Obermayer Co., Cincinnati, O.

Belting—
C. H. Besly & Co., Chicago, Ill.
Cling-Surface Mfg. Co., Buffalo, N. Y.
The Chicago Rawhide Mfg. Co., Chicago, Ill.
The Gandy Belting Co., Baltimore Md.
Cleveland Tool & Supply Co., Cleveland, O.
Main Belting Co., Philadelphia, Pa.

Belt Lacing—
The Bristol Co., Waterbury, Conn.

Bench Vises—
Massey Vise Co., Chicago, Ill.

Blacksmith and Carriage Supplies—
C. H. Besly & Co., Chicago, Ill.

Black Lead—
The S. Obermayer Co., Cincinnati, O.

Blowers—
B. F. Sturtevant Co., Boston, Mass
American Gas Furnace Co., New York City.

Blast Furnace Work –
Enterprise Boiler Co., Youngstown, O.
Meehan Boiler & Construction Co., Lowellville, Ohio.
Wm. B. Pollock & Co., Youngstown, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.

Boilers and Boiler Attachments—
Wm. B. Pollock & Co., Youngstown, O
Cahall Sales Department, Pittsburg, Pa.
Enterprise Boiler Co., Youngstown, O.
The Edward P. Allis Co., Milwaukee. Wis
Hooven, Owens & Rentschler Co , Hamilton, O.
Harrison Safety Boiler Works, Philadelphia.
Lane & Bodley Co., Cincinnati, O.
Meehan Boiler & Construction Co., Lowellville, Ohio.
Wm. Cramp & Sons, Philadelphia, Pa.
Riter-Conley Mfg. Co., Pittsburg, Pa.
The Aultman Co., Canton, O.

Boiler Covering—
C. H. Besly & Co., Chicago, Ill.

Boiler Compounds—
John M. Russell & Co., Springfield, O.

Boiler Fronts and Fittings—
The Lane & Bodley Co., Cincinnati, O
Playford Stoker Co., Cleveland, O.

Boiler Tubes—
S. Fix Sons, Cleveland, O.
National Tube Works Co., McKeesport, Pa.

Boiler Tube Cleaners—
Union Boiler Tube Cleaner Co., Pittsburg, Pa

Bolt Forging Machines—
Chicago Die and Machine Works, Chicago, Ill.

Bolts and Nuts—
Upson Nut Co., Cleveland. O.
Rockford Bolt Works, Rockford, Ill.

Bolt and Nut Machinery—
Chicago Die and Machine Works, Chicago, Ill.

Boring and Turning Mills—
H Bickford, Lakeport, N. H.
U. Baird Machinery Co., Pittsburg. Pa.
Baush & Harris Machine Tool Co., Springfield, Mass.

Brass Castings—
J. J. Ryan & Co., Chicago, Ill.

Brass Founders Supplies—
The S. Obermayer Co., Cincinnati, O.

Bridges—
Shiffler Bridge Co., Pittsburg.
Pittsburg Bridge Co., Pittsburg, Pa.

Buildings (Steel Frame.)—
Shiffler Bridge Co., Pittsburg.
Pittsburg Bridge Co., Pittsburg, Pa.
Riter-Conley Mfg. Co., Pittsburg, Pa.

Carrying Tongs—
Vulcan Mfg. Co., Pittsburg, Pa.

Castings—
Seaman-Sleeth Co., Pittsburg, Pa.
Lane & Bodley Co., Cincinnati, O.
Hooven, Owens & Rentschler Co., Hamilton, O.
W. A. Jones Foundry Co.. Chicago, Ill
Brass Founders' Supply Co., Newark, N. J.
The Aultman Co., Canton, O.

Castings (Aluminum)—
J. J. Ryan & Co., Chicago, Ill.

Castings (Brass)—
J. J. Ryan & Co., Chicago, Ill.

Castings (Bronze)—
J. J. Ryan & Co., Chicago, Ill.

Chain Hoists—
Edwin Harrington Son & Co., Philadelphia, Pa.
Reading Crane & Hoist Works, Reading, Pa.

Chain Belting—
Heyl & Patterson, Pittsburg, Pa.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
The Aultman Co., Canton, O.

Channelers—
The Ingersoll-Sergeant Drill Co., New York.

Charcoal—(Lump, powdered, granulated)—
The S. Obermayer Co., Cincinnati, O.

Chemists—
Dickman & MacKenzie, Chicago, Ill.
F. A. Emmerton, Cleveland, O.
O. Textor, Cleveland, O.
The R. W. Hunt & Co., Chicago, Ill.
Wellman Seaver Co., Cleveland, O.
Benedict Crowell, Cleveland, O.
John T. Jones & Co., Chicago, Ill.
J. Blodgett Britton & Co , Warrenton, Va.

Chilled and Sand Rolls—
Wm. Tod & Co , Youngstown, O
Seaman, Sleeth Co., Pittsburg, Pa.

Chucks—
Skinner Chuck Co., New Britain, Conn.
Massey Vise Co., Chicago, Ill.

Coal Cutters—
The Ingersoll-Sergeant Drill Co., New York.
Jeffrey Mfg. Co., Columbus, O.

Coal Screens—
Rob't. Aitchinson Per. Metal Co., Chicago, Ill.
Harrington & King Per. Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.

Coal and Coke—
Forster, Waterbury & Co., Chicago, Ill.
H. C. Frick Coke Co., Pittsburg, Pa.
McKeefrey & Co., Leetonia, O.
Washington Coal and Coke Co., Pittsburg, Pa.

Coal Mining Machinery—
Jeffrey Mfg. Co., Columbus, O.

Conveyors—
Jeffrey Mfg. Co., Columbus, O.
Heyl & Patterson, Pittsburg, Pa.
Link-Belt Machinery Co., Chicago, Ill.
The Aultman Co., Canton, O.
The Brown Hoisting and Conveying Machine Co., Cleveland, O.

Comparometers—
Vulcan Mfg. Co., Pittsburg, Pa.

Compressed Air Shop Tools—
Clayton Air Compressor Works, New York City.
Rand Drill Co., Chicago, Ill.
The Ingersoll-Sergeant Drill Co., New York.

Compression Couplings—
Geo. B. Sennett Co., Youngstown, O.
The Aultman Co., Canton, O.

Core Ovens—
Millett Core Oven Co., Brightwood, Mass.

Corrugated Iron—
Berger Mfg. Co., Canton, O.
Ætna-Standard Iron & Steel Co., Bridgeport, O.

Cranes and Derricks—
Wm. Tod & Co., Youngstown, O.
Marion Steam Shovel Co., Marion, O.
Edwin Harrington, Son & Co., Philadelphia.
Wellman-Seaver Engineering Co., Cleveland, O.
Reading Crane & Hoist Works, Reading, Pa.
The Bucyrus Co., South Milwaukee, Wis.
Brown Hoisting and Conveying Machine Co., Cleveland, Ohio.

Crucibles—
The S. Obermayer Co., Cincinnati, O.

Cupolas—
The S. Obermayer Co., Cincinnati, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.

Dies—
Ferracute Machine Co., Bridgeton, N. J.

Dredges—
Marion Steam Shovel Co., Marion, O.
The Bucyrus Co., South Milwaukee, Wis.

Drill Grinders—
J. Wendell Cole, Columbus, O.

Drill Presses—
C. H. Besly & Co., Chicago, Ill.
U. Baird Machinery Co., Pittsburg, Pa.
Edwin Harrington, Son & Co., Philadelphia.
Fox Machine Co., Grand Rapids, Mich.
Bickford Drill & Tool Co., Cincinnati, O.
Cleveland Tool & Supply co., Cleveland, O.
Baush & Harris Machine Tool Co., Springfield, Mass.

Drop Forgings—
Wyman & Gordon, Worcester, Mass.

Drop Presses—
Bertsch & Co., Cambridge City, Ind.
C. H. Besly & Co., Chicago, Ill.
Fox Machine Co., Grand Rapids, Mich.
Ferracute Machine Co., Bridgeton, N. J.
Long & Allstatter Co., Hamilton, O.
E. Konigslow & Bro., Cleveland, O.

Drop Hammers—
Baush & Harris Machine Tool Co., Springfield, Mass.

Dry Kilns—
B. F. Sturtevant Co., Boston.

Dynamos—
Jeffrey Mfg. Co., Columbus, O.

Eave Troughs and Conductors—
Berger Mfg. Co., Canton, O.

Elevators—
The Lane & Bodley Co., Cincinnati, O.

Elevating and Conveying Machinery—
Heyl & Patterson, Pittsburg, Pa.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
Lidgerwood Mfg. Co., New York City.
The Aultman Co , Canton, O.
The Brown Hoisting and Conveying Machine Co., Cleveland, O.

Emery and Corundum Wheels—
J. Wendell Cole. Columbus and Chicago.
The Hanson & Van Winkle Co., Newark, Chicago, New York.
Northampton Emery Wheel Co., Chicago, Ill.
Cleveland Tool & Supply Co., Cleveland. O.
Vitrified Wheel Co., Westfield, Mass.

Emery Wheel Machinery—
J. Wendell Cole, M. E., Columbus, O., or Chicago, Ill.
C. H. Besly & Co., Chicago, Ill.
The Hanson & Van Winkle Co., Newark, Chicago, New York
Northampton Emery Wheel Co., Chicago, Ill.
Cleveland Tool & Supply Co., Cleveland, O.

Engineers and Contractors—
Wellman Seaver Engineering Co., Cleveland.
Heyl & Patterson, Pittsburg, Pa.
Meehan Boiler & Construction Co., Lowellville Ohio.
E. E. Erickson, Pittsburg, Pa.
Benedict Crowell, Cleveland, O.
John T. Jones & Co., Chicago, Ill.
Riter-ConleyMfg. Co., Pittsburg, Pa.
Jeffrey Mfg. Co., Columbus, O.

Engine Packing—
Jenkins Bros., New York City.
C. H. Besly & Co., Chicago, Ill.

Engineers' Supplies—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.
John M. Russell & Co., Springfield, O.

Engine Lathes—
U. Baird Machinery Co., Pittsburg, Pa.
Edwin Harrington & Son Co., Philadelphia

Engines (Oil)—
The Aultman Co., Canton, O.

Engines (Steam)—
Wm. Tod & Co., Youngstown, O.
B. F. Sturtevant Co., Boston, Mass.
The Edward P. Allis Co,, Milwaukee, Wis.
The Hooven, Owens & Rentschler Co , Hamilton, O.
Lane & Bodley Co., Cincinnati, O.
Geo. B. Sennett Co., Youngstown, O.
The Aultman Co., Canton, O.

Engravers and Electrotypers—
Central Electrotype & Engraving Co., Cleveland, O.
National Engraving Co., Cleveland, O.
Eclipse Electrotype & Eng. Co., Cleveland, O.

Exhaust Heating Apparatus—
B. F. Sturtevant Co., Boston, Mass.

Fans—
American Gas Furnace Co., New York City.
B. F. Sturtevant Co., Boston, Mass.

Feed Water Heaters and Purifiers—
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.
Harrison Safety Boiler Works, Philadelphia, Pa.

Files, Makers of—
C. H. Besly & Co., Chicago, Ill.

Fire Brick and Clay—
J. V. Rose, Sharon, Pa.
Union Mining Co., Mt. Savage, Md.
Clearfield Fire Brick Co., Clearfield,
Dover Fire Brick Co., Cleveland, Pa
Diamond Fire Brick Works, Akron, O.
F. B. Stevens, Detroit, Mich.
The S. Obermayer Co., Cincinnati, O
Chicago Fire Clay Product Co. Chicago, Ill.
Columbia Fire Clay Co., Cleveland, O.
Scioto Star Fire Brick Works, Portsmouth, O.
Kentucky Fire Brick Works, Portsmouth O.
Webster Fire Brick Co., South Webster, O.
Ætna Fire Brick Co., Oak Hill, O.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.
Holmes, Strachan & Co., Detroit, Mich.

Fire Proof Covering—
C. H. Besly & Co., Chicago, Ill.

Flexible Shafts—
Union Boiler Tube Cleaner Co., Pittsburg, Pa.

Fluor Spar
James Irwin & Co., Pittsburg, Pa.

Foot and Power Lathes—
U. Baird Machinery Co., Pittsburg, Pa.
Edwin Harrington Son & Co., Philadelphia, Pa.

Foundries—
Wm. Tod & Co., Youngstown, O.
Seaman, Sleeth Co., Pittsburg, Pa.
The Lane & Bodley Co., Cincinnati, O.
Hooven, Owens & Rentschler Co., Hamilton, O.
W. A. Jones Foundry Co., Chicago.
Jeffrey Mfg. Co., Columbus, O.
Geo. B. Sennett Co., Youngstown, O.
Brass Founders' Supply Co., Newark, N. J.
The Aultman Co., Canton, O.
W. A. Wood Mowing & Reaping Machine Co., Hoosick Falls, N. Y.

Foundry Equipments—
The S. Obermayer Co., Cincinnati, O.

Foundry Supplies—
Clearfield Fire Brick Co., Clearfield, Pa.
The Ohio Sand Co., Conneaut, O.
Union Mining Co., Mt. Savage, Md.
Dover Fire-Brick Co., Cleveland, O.
Tabor Mfg. Co., Elizabeth, N. J.
F. B. Stevens, Detroit, Mich.
Heber Wells, New York City.
Millett Core Oven Co., Brightwood, Mass.
Hanson McDowell, Chicago, Ill.
Cleveland Facing Mill Co., Cleveland, O.
The S. Obermayer Co., Cincinnati, O.
Garden City Sand Co., Chicago, Ill.
James Irwin & Co., Pittsburg, Pa.
Chicago Fire Clay Product Co., Chicago, Ill.
Brass Founders' Supply Co., Newark, N. J.
Columbia Fire Clay Co., Cleveland, O.
Vulcan Mfg. Co., Pittsburg, Pa.
Scioto Star Fire Brick Works, Portsmouth, O.
Kentucky Fire Brick Works, Portsmouth, O.
Webster Fire Brick Co., South Webster, O.
Ætna Fire Brick Co., Oak Hill, O.
J. V. Rose, Sharon, Pa.
Diamond Fire Brick Works, Akron, O.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.
Holmes, Strachan & Co., Chicago, Ill.
Newport Sand Bank Co., Newport, Ky.

Foundry Facings—
The S. Obermayer Co., Cincinnati, O.
Cleveland Facing Mill Co., Cleveland, O.

Forgings—
Cleveland City Forge & Iron Co., Cleveland, O.
Bethlehem Iron Co., South Bethlehem, Pa.
Bræburn Steel Co., Braeburn, Pa.
Wyman & Gordon, Worchester, Mass.

Friction Metal—
C. H. Besly & Co., Chicago, Ill.
North American Metaline Co., Long Island City, New York.
Swarts Metal Refining Co., Chicago, Ill.

Furnaces—
Brightman Furnace Co., Cleveland, O.
Playford Stoker Co., Cleveland, O.

Furnace Linings—
Union Mining Co., Mt. Savage, Md.

Fuel Oil Burners—
W. S. Rockwell & Co., New York City.
American Gas Furnace Co., New York City.

Galvanized Iron—
Apollo Iron & Steel Co., Pittsburg, Pa.

Galvanizers—
Ætna-Standard Iron & Steel Co., Bridgeport, O.
Apollo Iron & Steel Co., Pittsburg, Pa.

Galvanizing Pots—
Wm. B. Pollock & Co., Youngstown, O.

Gas Burners—
American Gas Furnace Co., New York City.

Gas Furnaces—
American Gas Furnace Co., New York City.

Gear Cutting—
The R. D. Nuttall Co., Allegheny, Pa.
Brainard Milling Machine Co., Hyde Park, Mass.
The Van Dorn & Dutton Co., Cleveland, O.

Gear Cutters—
Brainard Milling Machine Co., Hyde Park, Mass.

Grindstones—
C. H. Besly & Co., Chicago, Ill.

Graphite Paint—
Jos. Dixon Crucible Co., Jersey City N. J.,

Gray Iron Castings—
W. A. Jones Foundry Co., Chicago, Ill.
The Lane & Bodley Co., Cincinnati, O.
Brass Founders' Supply Co., Newark, N. J.

Hack Saws—
Millers Falls Co., New York City.
Q & C Co., Chicago, Ill.

Hangers—
E. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.

Harness Snaps—
Covert Mfg. Co., West Troy, N. Y.

Hoists—
Edwin Harrington Son & Co., Philadelphia.
Reading Crane & Hoist Works, Reading, Pa.
The Lane & Bodley Co., Cincinnati, C.
The Aultman Co., Canton, O.
Lidgerwood Mfg. Co., New York City.

Heaters and Purifiers—
Harrison Safety Boiler Works, Philadelphia.
Stilwell-Bierce & Smith-Vaile Co., Dayton O.

Heating and Ventilating Apparatus
B. F. Sturtevant Co., Boston.

Heavy Hardware—
C. H. Besly & Co., Chicago, Ill.
Parkhurst & Wilkinson Co., Chicago, Ill.

Hoisting Engines—
The Edward P. Allis Co., Milwaukee, Wis.
Earle C. Bacon, New York City.
The Lane & Bodley Co., Cincinnati, O.
Lidgerwood Mfg. Co., New York City.
The Aultman Co., Canton, O.

Hoisting Machinery—
Link-Belt Machinery Co., Chicago, Ill.
Reading Crane & Hoist Works, Reading, Pa.
Jeffrey Mfg. Co., Columbus, O.
The Lane & Bodley Co., Cincinnati, O.
Earl C. Bacon, New York City.
Lidgerwood Mfg. Co., New York City.
Heyl & Patterson, Pittsburg, Pa.
The Aultman Co., Canton, O.
The Brown Hoisting and Conveying Machine Co., Cleveland, O.

Horse Shoes—
Phoenix Horse Shoe Co., Joliett, Ill.

Hotels—
United States Hotel Co., Cleveland, O.

Hydraulic Machinery—
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

Injectors—
C. H. Besly & Co., Chicago, Ill.

Insurance Companies—
Hartford Steam Boiler I. & I. Co., Hartford, Ct.

Iron Buildings—
Shiffler Bridge Co., Pittsburg, Pa.
Pittsburg Bridge Co., Pittsburg, Pa.
Riter-Conely Co., Pittsburg, Pa.

Iron Nails and Steel—
Bethlehem Iron Co., South Bethlehem, Pa.
C. H. Besly & Co., Chicago, Ill.
E. H. Stroud & Co., Chicago, Ill.
Parkhurst & Wilkinson Co., Chicago, Ill.

Iron and Steel Roofing—
Berger Mfg. Co., Canton, O.
Ætna-Standard Iron & Steel Co., Bridgeport, O.

Iron Ore—
Lake Superior Consolidated Iron Mines New York City, N. Y.
Oglebay, Norton & Co., Cleveland, O.
M. A. Hanna & Co., Cleveland, O.

Iron Working Tools—
H. Bickford, Lakeport, N. H
C. H. Besly & Co., Chicago, Ill.
John Adt & Son, New Haven, Conn.
U. Baird Machinery Co., Pittsburg, Pa.
Edwin Harrington Son & Co., Philadelphia, Pa.
Fox Machine Co., Grand Rapids, Mich.
Armstrong Bros. Tool Co., Chicago, Ill.
The Armstrong Mfg. Co., Bridgeport, Conn.
Chicago Die and Machine Works, Chicago, Ill.
Bickford Drill & Tool Co., Cincinnati, O.
Skinner Chuck Co., New Britain, Conn.
Cleveland Tool & Supply Co., Cleveland, O.
Brainard Milling Machine Co., Hyde Park, Mass.
Baush & Harris Machine Tool Co., Springfield, Mass.
Massey Vise Co., Chicago, Ill.

Link Belting—
The Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
Heyl & Patterson, Pittsburg, Pa.
The Aultman Co., Canton, O.

Ladles—
The S. Obermayer Co., Cincinnati, O.

Lathes—
U. Baird Machinery Co., Pittsburg, Pa.
Edwin Harrington, Son & Co., Philadelphia.
Bickford Drill & Tool Co., Cincinnati, O.

Machinery Name Plates—
August Becker, Boston, Mass.

Machinists' Tools and Supplies—
H. Bickford, Lakeport, N. H.
C. H. Besly & Co., Chicago, Ill.
U. Baird Machinery Co., Pittsburg, Pa.
Bertsch & Co., Cambridge City, Ind.
Edwin Harrington Son & Co., Philadelphia, Pa.
Fox Machine Co., Grand Rapids, Mich.
Armstrong Bros. Tool Co., Chicago, Ill.
Bickford Drill & Tool Co., Cincinnati, O.
Parkhurst & Wilkinson Co., Chicago, Ill.
Skinner Chuck Co., New Britain, Conn.
Cleveland Tool & Supply Co., Cleveland, O.
Baush & Harris Machine Tool Co., Springfield, Mass.
Massey Vise Co., Chicago, Ill.

Machinists' Vises—
Massey Vise Co., Chicago, Ill.

Machine Screws—
C. H. Besly & Co., Chicago, Ill.

Machine Shops—
The R. D. Nuttall Co., Allegheny, Pa.
The Lane & Bodley Co., Cincinnati, O.

Machinery and Tool Steel—
C. H. Besley & Co., Chicago, Ill.
Bræburn Steel Co., Bræburn, Pa.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa
Sanderson Bros. Steel Co., Cleveland, O.
Byron H. White, Chicago, Ill.
Morris & Bailey Steel Co., Pittsburg, Pa.

Magnesia Covering—
C. H. Besly & Co., Chicago, Ill.

Malleable Iron Castings—
W. A. Wood Mowing & Reaping Machine Co., Hoosick Falls, N. Y.

Manufacturing Chemists—
James Irwin & Co., Pittsburg, Pa.

Manufactured Iron & Steel—
Bourne-Fuller & Co., Cleveland, O.
Cleveland Rolling Mill Co., Cleveland, O.
Ætna-Standard Iron & Steel Co., Bridgeport, O.
The Morris & Bailey Steel Co., Pittsburg, Pa.
Parkhurst & Wilkinson Co., Chicago, Ill.
Ohio Steel Co., Youngstown, O.

Metal Bearings—
North American Metaline Co., Long Island City, N. Y.
C. H. Besly & Co., Chicago, Ill.

Milling Machines—
U. Baird Machinery Co., Pittsburg, Pa.
Fox Machine Co., Grand Rapids, Mich.
Brainard Milling Machine Co., Hyde Park, Mass.

Mining Machinery—
C. H. Besly & Co., Chicago, Ill.
The Edward P. Allis Co., Milwaukee, Wis.
Earle C. Bacon, New York City.
The Lane & Bodley Co., Cincinnati, O.
Jeffrey Mfg. Co., Columbus, O.
Lidgerwood Mfg. Co., New York City.
Wm. Cramp & Sons, Philadelphia, Pa.
The Bucyrus Co., South Milwaukee, Wis.
Marion Steam Shovel Co., Marion, O.

Molding Machines—
Tabor Mfg. Co., Elizabeth, N. J.

Mine Pumps—
Fred M. Prescott Steam Pump Co., Milwaukee, Wis.

Molding Sand—
Ohio Sand Co., Conneaut, O.
F. B. Stevens, Detroit, Mich.
S. Obermayer Co., Cincinnati, O.
Garden City Sand Co., Chicago, Ill.
Newport Sand Bank Co., Newport, Ky.

Molders' Tools—
The S. Obermayer Co., Cincinnati, O.

Name Plates—
August Becker, Boston, Mass.

Nickel Plating Outfits—
The Hanson & Van Winkle Co., Newark, Chicago, New York.
Northampton Emery Wheel Co., Chicago, Ill.

Nuts and Bolts
Rockford Bolt Works, Rockford, Ill.
Upson Nut Co., Cleveland, O.

Oilless Bearings—
North American Metaline Co., Long Island, City, N. Y.
C. H. Besly & Co., Chicago, Ill.

Oil Burners—
W. S. Rockwell & Co., New York City.
American Gas Furnace Co., New York City.

Oil Cups—
C. H. Besly & Co., Chicago, Ill.

Oil Pumps—
C. H. Besly & Co., Chicago, Ill.

Ore Crushers—
The Edward P. Allis Co., Milwaukee, Wis.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.

Ore Screens—
Rob't Aitchison Per. Metal Co., Chicago, Ill.
Harrington & King Per. Co., Chicago, Ill.
The Aultman Co., Canton, O.

Packing—
C. H. Besly & Co., Chicago, Ill
Jenkins Bros., New York City.

Paint—
Iron Clad Paint Co., Cleveland, O.
Jos. Dixon Crucible Co., Jersey City, N. J.
Standard Paint Co., New York, City.

Pattern Letters—
Heber Wells, New York City.

Pattern Makers' Vises—
Massey Vise Co., Chicago, Ill.

Pattern Works—
Gobeille Pattern Co., Cleveland O.

Perforated Sheet Metal—
Harrington & King Perforating Co., Chicago, Ill
Aitchison Perforated Metal Co., Chicago, Ill.

Pig Iron—
Clinton Iron & Steel Co., Pittsburg.
Forster, Waterbury & Co., Chicago, Ill.
Bourne-Fuller Co. Cleveland, O.
M. A. Hanna & Co., Cleveland, O.
E. H. Stroud & Co., Chicago, Ill.
F. B. Stevens, Detroit, Mich.
McKeefrey & Co., Leetonia, O.
Superior Charcoal Iron Co., Grand Rapids, Mich
Hickman & Williams, Chicago, Ill.
Shenango Valley Steel Co., New Castle, Pa.
Spearman Iron Co., Sharpsville, Pa.
Salisbury Carbonate Iron Co., New York City.

Pipe Covering—
C. H. Besly & Co., Chicago. Ill.
Jenkins Bros., New York City.

Pipe Cutting and Threading Machines—
The Armstrong Mfg. Co., Bridgeport, Conn.

Planers—
U. Baird Machinery Co., Pittsburg, Pa.
Bickford Drill & Tool Co., Cincinnati, O.

Planer Chucks—
Massey Vise Co., Chicago, Ill.

Plates—
Enterprise Boiler Co., Youngstown, O.

Plumbago—
The S. Obermayer Co., Cincinnati, O.

Plumbers' and Gas Fitters' Supplies—
C. H. Besly & Co., Chicago, Ill.

Pneumatic Appliances—
Clayton Air Compressor Works, New York.

Pneumatic Tools —
American Pneumatic Tool Co., New York City

Portable Forge—
C. H. Besly & Co., Chicago, Ill.
B. F. Sturtevant Co., Boston, Mass.
Vulcan Mfg. Co., Pittsburg, Pa.

Power Drop Hammers—
Baush & Harris Machine Tool Co., Springfield Mass.

Power Presses—
Bertsch & Co., Cambridge City, Ind.
Fox Machine Co., Grand Rapids, Mich.
The Long & Allstatter Co., Hamilton, O.
Ferracute Machine Co., Bridgeton, N. J.
E. Konigslow & Bro. Cleveland, O.

Power Transmission Machinery—
Jeffrey Mfg. Co., Columbus, O.
The Lane & Bodley Co., Cincinnati, O.
E. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.

Presses—
Bertsch & Co., Cambridge City, Ind.
C. H. Besly & Co., Chicago, Ill.
The Long & Allstatter Co., Hamilton, O.
Ferracute Machine Co., Bridgeton, N. J.
E. Konigslow & Bro. Cleveland, O.

Pressure Gauges—
The Bristol Co., Waterbury, Conn.

Pulleys—
W. A. Jones Foundry Co., Chicago, Ill.
The Lane & Bodley Co., Cincinnati, O.
E. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
Jeffrey Mfg. Co., Columbus, O.

Pumps (Steam)—
The Edward P. Allis Co., Milwaukee, Wis.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O
Blakeslee Mfg. Co., Du Quoin, Ill.
Fred M. Prescott Steam Pump Co., Milwaukee, Wis.

Punches—
The Long & Allstatter Co., Hamilton, O.
Ferracute Machine Co., Bridgeton, N. J.
B. Konigslow & Bro. Cleveland, O.

Pyrometers—
Edward Brown, Philadelphia, Pa.
Uehling, Steinbart & Co., Newark, N. J.
Vulcan Mfg. Co., Pittsburg, Pa.

Railway Supplies—
Cleveland City Forge & Iron Co., Cleveland, O.

Rivets—
Champion Rivet Co., Cleveland, O.

Riveted Steel Pipe—
Wm. B. Pollock & Co. Youngstown, O.

Rock Drills—
Rand Drill Co., Chicago, Ill.
The Ingersoll-Sergeant Drill Co., New York.

Roofs—
Shiffler Bridge Co., Pittsburg.
Berlin Iron Bridge Co., East Berlin, Conn.
Pittsburg Bridge Co., Pittsburg, Pa.
Riter-Conley Mfg. Co., Pittsburg, Pa.

Sand—
David Tod Sand Co., Youngstown, O.

Sand and Chill Rolls—
Seaman, Sleeth Co., Pittsburg, Pa.

Saws—
Peter Gerlach & Co., Cleveland, O.

Screens for Coal Ore, Etc.
Robt. Aitchison Perforated Metal Co., Chicago.
Harrington & King Perforating Co., Chicago.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.

Screws—
C. H. Besly & Co., Chicago, Ill.
Upson Nut Co., Cleveland, O.
Chicago Screw Co., Chicago, Ill
Rockford Bolt Works, Rockford, Ill.

Shafting—
The Lane & Bodley Co., Cincinnati, O.
E. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
Fitzsimmons & Co., Cleveland, O.
The Aultman Co., Canton, O.
Jeffrey Mfg. Co., Columbus, O.

Shapers—
Baush & Harris Machine Tool Co., Springfield, Mass.

Shearing and Punching Machinery—
Bertsch & Co., Cambridge City, Ind.
Fox Machine Co., Grand Rapids, Mich.
The Long & Allstatter Co., Hamilton, O.
Ferracute Machine Co., Bridgeton, N. J.

Sheet Iron—
Cleveland Rolling Mill Co., Cleveland, O.
Ætna-Standard Iron & Steel Co., Bridgeport, O.
E. H. Stroud & Co., Chicago, Ill.

Ship Yards—
Wm. Cramp & Sons, Philadelphia, Pa.

Special Machinery—
Edwin Harrington Son & Co., Philadelphia.
Q & C Co., Chicago, Ill.
A. H. Nilson Machine Co., Bridgeport, Conn.
The Aultman Co., Canton, O.
Jeffrey Mfg. Co., Columbus, O.
B. Konigslow & Bro. Cleveland, O.

Stand Pipes—
Wm. B. Pollock & Co., Youngstown, O.

Steam Boiler Inspectors—
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

Steam Pipe and Boiler Covering—
C. H. Besly & Co., Chicago Ill.

Steam Packing—
C. H. Besly & Co., Chicago, Ill.

Steam Pumps—
Hall Steam Pump Co., Pittsburg, Pa.
Stilwell-Bierce & Smith-Vail Co., Dayton, O.
Blakeslee Mfg. Co., Du Quoin, Ill.

Steam Shovels and Dredges—
Marion Steam Shovel Co., Marion, O.
The Bucyrus Co., South Milwaukee, Wis.

Steam Specialties—
C. H. Besly & Co., Chicago, Ill.

Steel—
Otis Steel Co., Cleveland, O.
Miller, Wagoner, Fieser & Co., Chicago, Ill.
E. H. Stroud & Co., Chicago, Ill.
Bræburn Steel Co., Bræburn, Pa.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa.
The Morris & Bailey Steel Co., Pittsburg, Pa.
Sanderson Bros. Steel Co., Cleveland, O.
Byron H. White, Chicago, Ill.

Steel Castings—
Otis Steel Co., Cleveland, O.
Q & C Co., Chicago, Ill.
Hanson McDowell, Chicago, Ill.

Steel Plants—
Wm. B. Pollock & Co., Youngstown, O.
The Riter-Conley Co., Pittsburg, Pa.

Steel Blooms and Billets—
Cleveland Rolling Mill Co., Cleveland.
Bethlehem Iron Co., South Bethlehem, Pa.
Ohio Steel Co., Youngstown, Ohio.
Shenango Valley Steel Co., New Castle, Pa.

Steel Stamps and Stencils—
J. H. Ficharty & Co., Cleveland, O.

Semi-Steel—
Hanson McDowell, Chicago, Ill.

Stokers—
Playford Stoker Co., Cleveland, O.

Tanks—
Enterprise Boiler Co., Youngstown, O.
Meehan Boiler & Construction Co., Lowellville, Ohio.
Wm. B. Pollock & Co., Youngstown, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.
The Aultman Co., Canton, O.

Tank Cars—
Wm. B. Pollock & Co., Youngstown, O.

Tin and Terne Plates—
B. P. Crane & Co., Chicago, Ill.
E. H. Stroud & Co., Chicago, Ill
American Tin Plate Company, Chicago, Ill.

Tool Steel—
C. H. Besly & Co., Chicago
Bræburn Steel Co., Bræburn, Pa.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa.
Sanderson Bros. Steel Co., Cleveland, O.

Transmission Machinery—
Heyl & Patterson, Pittsburg, Pa.
Link-Belt Machinery Co., Chicago, Ill.
The Lane & Bodley Co., Cincinnati, O.
W. A. Jones Foundry & Machine Co., Chicago, Ill
Jeffrey Mfg. Co., Columbus, O.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
Brown Hoisting and Conveying Machine Co., Cleveland, Ohio.

Tubes—
National Tube Works, McKeesport, Pa.

Tube Welding—
S. Fix Sons, Cleveland, O.

Tumbling Mills—
The S. Obermayer Co., Cincinnati, O.

Turnbuckles—
Cleveland City Forge & Iron Co., Cleveland, O.

Twist Drills—
C. H. Besly & Co., Chicago, Ill.

Twist Drill Cases—
Vulcan Mfg. Co., Pittsburg, Pa.

Valves—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.

Ventilating Fans—
B. F. Sturtevant Co., Boston Mass.

Vises—
Massey Vise Co., Chicago, Ill.

Wire Machinery—
John Adt & Son, New Haven, Conn.
S. W. Goodyear, Waterbury, Conn.
A. H. Nilson Machine Co., Bridgeport, Conn.

Wire Nails—
Cleveland Rolling Mill Co., Cleveland, O.
Shenango Valley Steel Co., New Castle, Pa.

Wood Pulleys—
Dodge Mfg. Co., Mishawaka, Ind.

Wrought Pipe—
National Tube Works, McKeesport, Pa.

Alphabetical List of Advertisers.

The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

	PAGE
Adt & Son, John	27
Ætna-Standard Iron & Steel Co	28
Ætna Fire Brick Co	32
Aitchison, Rob't, Perforated Metal Co	31
Allis & Co., Edward P	39
†American Gas Furnace Co	24
*American Pneumatic Tool Co	—
American Tin Plate Company	41
Apollo Iron & Steel Co	1
Armstrong Bros. Tool Co	1
Armstrong Mfg. Co	27
Aultman Co	2
Bacon, Earle C	29
Baird Machinery Co	22
Baush & Harris Machine Tool Co	44
Becker, August	1
*Berger Mfg. Co	28
*Bertsch & Co	—
Besly & Co., Chas. H	44
Bethlehem Iron Co	43
*Bickford Drill & Tool Co	—
Bickford, H	44
Blakeslee Mfg. Co	1
Bourne-Fuller Co	28
Bræburn Steel Co	37
Brainard Milling Machine Co	27
Brass Founders' Supply Co	26
Breitung, Edward N	29
Bristol Co., The	1
Britton & Co., J. Blodgett	2
*Brown, Edward	27
Brown Hoisting and Conveying Machine Co	30
Bucyrus Co	30
Cahall Sales Department	1
Central Electrotype & Engraving Co	41
*Champion Rivet Co	29
Chicago Fire Clay Product Co	32
Chicago & Northwestern Ry	38
*Chicago Die & Machine Co	37
Chicago Press Clipping Bureau	30
*Chicago Rawhide Mfg. Co	—
Chicago Screw Co	1
Clayton Air Compressor Works	2
Clearfield Fire Brick Co	32
Cleveland City Forge & Iron Co	1
†Cleveland Facing Mill Co	—
Cleveland Rolling Mill Co	28
Cleveland Tool & Supply Co	27
Cling-Surface Mfg. Co	1
Clinton Iron & Steel Co	28
*C. M. & St. P. Ry	31
Cole, J. Wendell	44
Columbia Fire Clay Co	32
Covert Mfg. Co	30
Cramp & Sons, Wm	40
Crane & Co., B. P	43
Crescent Steel Co	37
Crowell Benedict	1
Delano, E. A	28
Diamond Fire Brick Works	32
Dickman & MacKenzie	2
Dixon, Jos., Crucible Co	40
*Dodge Mfg. Co	—
Dover Fire Brick Co	35
Eclipse Electrotype & Engraving Co	39
Emmerton, F. A	41
Enterprise Boiler Co	2
Erikson, Edward E	1
*Ferracute Machine Co	21
Fitzsimons & Co	—
Fix Sons	37
Flecharty, J. H. & Co	—
Forster, Waterbury & Co	2
Fox Machine Co	1
Frick Coke Co., H. C	—
Gandy Belting Co	1
Garden City Sand Co	44
Gerlach, Peter & Co	32
Gobeille Pattern Co	29
Goodyear, S. W	37
Hall Steam Pump Co	27
Hanna & Co., M. A	33
*Hanson & Van Winkle Co	28
Harrington & King Perforating Co	38
Harrington Son & Co., Edwin	1
Harrison Safety Boiler Works	23
Hartford Steam Boiler Insp. & Ins. Co	20
Heyl & Patterson	29
†Hickman & Williams	30
Holmes, Strachan & Co	—
Hooven, Owens & Rentschler Co	33
Hunt Robt. W., & Co	26
Illinois Central R. R	2
Ingersoll-Sargent Drill Co	43
Iron Clad Paint Co	2
Irwin and Co., James	40
Jeffrey Mfg. Co	33
Jenkins Bros	31
Jones & Co., John T	40
Jones Foundry & Machine Co., W. A	2
Kentucky Fire Brick Works	1
Konigslow & Bro., B	22
La Belle Steel Co	27
Lake Superior Consolidated Iron Mines	37
Lane & Bodley	28
Lidgerwood Mfg Co	39
Link-Belt Machinery Co	30
Long & Allstatter Co., The	30
Lusch, H. B	21
Main Belting Co	2
Marion Steam Shovel Co	27
Massey Vice Co	43
McDowell, Hanson	1
McKeefrey & Co	22
Meehan Boiler & Construction Co	28
Millers Falls Co	44
Millett Core Oven Co	44
†Modern Machinery	31
Morris & Bailey Steel Co	—
*National Engraving Co	37
National Tube Works Co	27
†Newport Sand Bank Co	43
Nilson, A. H., Machine Co	—
North American Metaline Co	37
Northampton Emery Wheel Co	44
Nuttall Co. The R. D	38
Oak Hill Fire Brick & Coal Co	26
Obermayer, S. & Co	31
Oglebay, Norton & Co	32
†Ohio Sand Co	28
Ohio Steel Co	—
Otis Steel Co	28
*Parkhurst & Wilkinson Co	31
Phœnix Horse Shoe Co	—
Pittsburg Bridge Co	43
Playford Stoker Co	31
Pollock, Wm. B. & Co	40
Prescott Steam Pump Co	2
Q & C Co	38
Rand Drill Co	20
Reading Crane & Hoist Works	2
Riter-Conley Mfg. Co	30
Rockford Bolt Works	31
Rockwell & Co., W. S	2
†Russell & Co., John M	—
Ryan, J. J. & Co	26
Salisbury Carbonate Iron Co	28
Sanderson Bros. Steel Co	37
Seaman, Sleeth Co	42
Sennett Co., Geo. B	39
Scioto Star Fire Brick Works	32
‖Sharon Fire Brick Works	—
Shenango Valley Steel Co	21
Shiffler Bridge Co	31
Skinner Chuck Co	27
Spearman Iron Co	44
Standard Paint Co	22
Stevens, F. B	44
Stilwell-Bierce & Smith-Vaile Co	2
Stroud & Co., E. H	2
Sturtevant Co., B. F	25
*Superior Charcoal Iron Co	29
Swarts Metal Refining Co	2
Tabor Mfg Co	32
Textor, O	2
*Tod Sand Co., David	—
Tod, Wm. & Co	39
*Uehling, Steinbart & Co	33
Union Mining Co	21
Union Boiler Tube Cleaner Co	1
United States Hotel Co	33
Upson Nut Co	1
Van Dorn & Dutton Co	26
Vitrified Wheel Co	38
Vulcan Mfg. Co	30
Washington Coal and Coke Co	33
Webster Fire Brick Co	1
Wells, Heber	29
Wellman Seaver Engineering Co	42
White, Byron H	37
Wood Mowing & Reaping Machine Co	41
Wyman & Gordon	43

BRÆBURN STEEL COMPANY, Bræburn, Pa.
MANUFACTURERS OF
FINE TOOL STEEL AND FORGINGS. ALSO SPRING HAMMER, AND MACHINERY STEEL OF HIGH QUALITY. FINE OPEN-HEARTH STEEL.

DIRECTORS: Wm. Metcalf, Chas. Metcalf, F. B. Hasbrouck, R. P. Kelly, Sec'y. and Treas.

MORE WEAR from your tools
.....Almost no **STEEL EXPENSE**
NO TROUBLE
"It pays to use the most reliable tool steel in the market."
SANDERSON BROS. STEEL CO.
Cleveland Warehouse, 97 Water St.

CRESCENT STEEL
ESTABLISHED 1865 * INCORPORATED 1889.
CRESCENT STEEL CO.
480 PEARL ST. NEW YORK — PITTSBURGH, PA. — 64 & 66 S. CLINTON ST. CHICAGO.

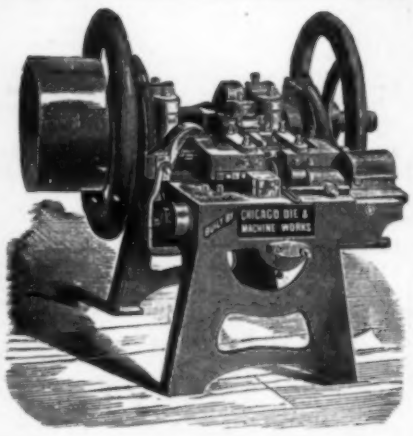
La BELLE STEEL CO., Pittsburgh, Pa.
MANUFACTURERS OF FINE
CRUCIBLE CAST TOOL STEEL.
SPECIAL GRADES FOR ALL PURPOSES.
BYRON H. WHITE,
Western Selling Agent.
OFFICE AND WAREHOUSE: **68 and 70 South Canal St., Chicago.**

ECLIPSE
"ECLIPSE" COLD DRAWN SHAFTING
FITZSIMONS & CO. CLEVELAND, OHIO
BYRON H. WHITE WESTERN SELLING AGENT
WAREHOUSE & OFFICE 68-70 SO. CANAL ST. CHICAGO

BYRON H. WHITE, Western Selling Agent,
68-70 South Canal St., Chicago.

THE MORRIS & BAILEY STEEL CO.
COLD ROLLED STRIP STEEL
FLAT & COILED FOR STAMPING BLANKING DRAWING SPRINGS ETC
WAREHOUSE & OFFICE 68 70 S. CANAL ST CHICAGO
BYRON H. WHITE WESTERN SELLING AGENT
PITTSBURG, PA.

BYRON H. WHITE, Western Selling Agent, CHICAGO.



CHICAGO DIE AND MACHINE WORKS
MANUFACTURERS OF
Bolt Forging Machines
NUT TAPPERS, IRON CUTTERS,
Power, Screw and Lever Presses, Dies.
Furnaces for Heating Ends of Iron for Bolts.
SPECIAL MACHINERY
87 to 91 West Lake St., Chicago.

Don't Waste Money in Your Pattern Shop.
THE GOBEILLE PATTERN CO., Cleveland.

Between the Lakes and the Gulf, the Mississippi and the Allegheny Mountains—the best buying section of the United States—is the BULK of THE IRON TRADE REVIEW'S circulation. In this section advertisers in all trade papers get best returns.

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

Special low-phosphorus hard Ore, Bessemer	3.65
No. 1 Specular, Bessemer	3.01@3.35
No. 1 Bessemer hematite	2.75@3.15
Hematites No. 1 non-Bessemer	1.90@2.10
No 1. Specular, non-Bessemer	2.00@2.40
Mesabi Bessemer	1.80@2.00

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	11 15
No. 1 Strong Foundry	11 00@11 25
No. 2 Strong Foundry	10 50@10 75
Gray Forge, red short	10 50
Gray Forge, neutral	10 25
No. 1 American Scotch	11 15@11 40
No. 2 American Scotch	10 65@10 90
Lake Superior Charcoal	11 50@12 00
PITTSBURG:	
No. 1 Foundry	$11 00@11 30
No. 2 Foundry	10 50@10 60
Gray Forge	9 75@9 85
White and Mottled	9 50
Warm Blast Charcoal	13 00@13 50
Cold Blast Charcoal	22 00@26 00
Bessemer	11 15
CHICAGO:	
Lake Superior Charcoal	$11 50@$13 00
Local Coke Foundry No. 1	11 50@12 00
Local Coke Foundry No. 2	11 00@11 50
Local Coke Foundry No. 3	10 75@11 00
Local Scotch Foundry No. 1	11 50@12 00
Local Scotch Foundry No. 2	11 00@11 50
Local Scotch Foundry No. 3	10 75@11 00
Southern Coke No. 1	@10 85
Southern Coke No. 2	@10 60
Southern Coke No. 3	@10 10
Southern No. 1 Soft	@10 80
Southern No. 2 Soft	@10 65
Southern Silveries	11 25@11 50
Jackson Co. Silveries	12 50@14 50
Ohio Silveries No. 1	@
Ohio Strong Softeners	12 00@12 50
Alabama Car Wheel	15 00@16 00
Malleable Bessemer	11 50@12 00
Coke Bessemer	11 50@12 00
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$@10 50
Southern Coke No. 2 and No. 1 Soft	@10 25
Hanging Rock Coke, No 1	@11 00
Hanging Rock Charcoal No. 1, Fdy	15 50@16 00
Tennessee Charcoal No 1	14 00@14 25
Jackson County Silvery No 1	12 50@12 75
Southern Coke, Gray Forge	@9 25
" " Mottled	@9 25
Standard Georgia Car Wheel	14 25@1500
Tennessee " "	13 00@14 00
Lake Superior " "	14 25@14 50
BUFFALO:	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	11 00@11 25
No. 2 Foundry Strong Coke Iron Lake Superior Ore	11 50@11 75
Ohio Strong Softener No. 1	11 50@11 75
Jackson Co. Silvery No. 1	@14 00
Lake Superior Charcoal	12 00@12 50
Southern Soft No. 1	@12 25
" " No. 2	@12 00
ST. LOUIS:	
Southern Coke No 1	$@$10 50
Southern Coke No. 2	@10 25
Southern Coke No. 3	@9 75
Southern Gray Forge	@9 25
Southern Charcoal No. 1	@20 50
Missouri Bessemer	@13 00
Lake Superior Car Wheel	@13 00
Ohio Softeners	@14 00
Southern Car Wheel	@15 00

OLD RAILS AND SCRAP METAL.

[Delivered Cleveland.]	Gross Tons
Old iron rails	$14 00
Old steel rails (6 ft. and over)	9 75
Old steel rails (6 ft. and under)	9 75
Old car wheels	11 00
	Net Tons
No. 1 R. R. wrought scrap	$11 50
Mill scrap	8 50
No. 1 Machine cast scrap	8 25
Iron axles	15 50
Axle turnings	8 00
Wrought turnings (free from cast)	7 00
Cast borings	5 50
Uncut wrought iron boilers	5 00
Steel boiler plates	8 00
Grate bars	5 50
Pipes and flues (clean)	7 50
Tank iron	8 00
Hoop and band iron	7 50
Sheet iron	5 25
Wrought drillings	6 50
Malleable iron	8 50

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. Cleveland)	1.40c
Angles	1.50c
Tees	1.40c
Universal Plates	1.40@1.45c
Sheared Plates	1.45c

MERCHANT IRON AND STEEL.

[Less than car-lots, Cleveland.]

Rounds and Squares.—Bar Iron.

1 to 1⅞	1.05 Base.
2 to 2⅞	.20 extra.
3 to 3⅞	.50 "
3¾ to 4	.80 "
4⅛ to 4½	1.00 "
4¾ to 5	1.30 "
5¼ to 6	1.80 "
5 ¼ to 6¾	"

VITRIFIED EMERY AND CORUNDUM WHEELS. . .

FOR

Foundry and Machine Shop Work.

CAN BE RUN WET OR DRY.

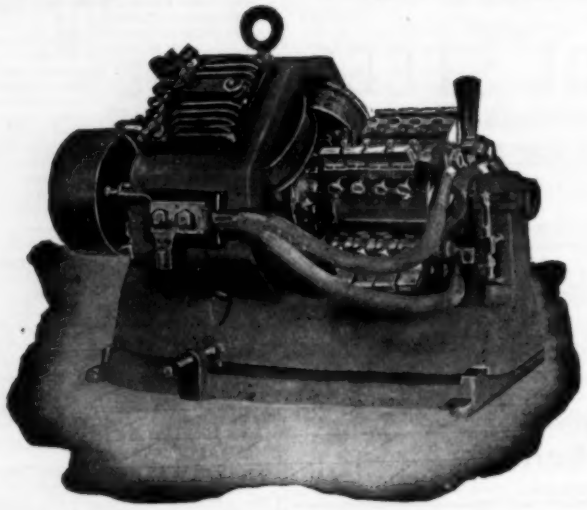
SOLD BY
Weed & Co., Buffalo, N. Y.
Strong, Carlisle & Hammond Co., Cleveland, O.
Machinist Supply Co., Chicago, Ill.
Sligo Iron Store Co., St. Louis, Mo.

VITRIFIED EMERY WHEEL CO.,
Westfield, Mass.

Eddy Dynamo Electro-Plating Machines

FOR

BICYCLE PLATING PLANTS.



NORTHAMPTON EMERY WHEEL CO., 20 S. Canal St., Chicago, Ill.

EXCLUSIVE WESTERN SELLING AGENTS.

PIONEERS LEADERS

LOW SPEED DYNAMOS. NICKEL ANODES. LACQUERS.

NICKEL PLATING OUTFITS

BUFFS. CYANIDE POTASH. TURKISH EMERY. POLISHING MACHINERY.

THE HANSON & VAN WINKLE CO.

NEWARK CHICAGO NEW YORK

The Iron Trade Review

Pays special attention to iron ore, blast furnace, rolling mill, foundry and machine shop interests. Per year **$3.00.**

6⅝ to 7¼	2.50 extra
¾ to ⅞	.10 "
⅝ to 11-16	.20 "
⅞ to 9-16	.30 "
7-16 to 15-32	.40 "
⅜ to 13 2	.50 "
5-16 to / 32	.70 "
¼ to 9-32	.90 "
7-32	1.40 "
3-16	2.50 "

Flats.—Bar Iron.

1⅛ to 4 x ⅜ to 1	1.05 Base
4¼ 0 6 x ⅜ to 1	.10 extra
6¼ 0 8 x ⅜ to 1	.60 "
8¼ 0 10 x ⅜ to 1	.80 "
1⅜ 0 4 x 1 1-16 to 1½	.30 "
4¼ to 6 x 1 1-16 to 1½	.40 "
6¼ to 8 x 1 1-16 to 1½	.60 "
8¼ to 10 x 1 1-16 to 1½	.90 "
2 to 4 x 1⅝ to 2	.50 "
4¼ to 6 x 1⅝ to 2	.60 "
6¼ to 8 x 1⅝ to 2	.80 "
8¼ to 10 x 1⅝ to 2	1.00 "
2 to 4 x 2¼ to 3	.60 "
4¼ to 6 x 2¼ to 3	.80 "
6¼ to 8 x 2¼ to 3	1.00 "
1⅜ to 1¾ x ⅜ to 1	.10 "
1 to 1 1-16 x ⅜ to ⅝	.20 "
¾ to 15-16 x ⅜ to ¾	.40 "
⅝ to 11-16 x ⅜ to ⅝	.50 "
⅞ to 9-16 x ⅜ to ⅞	.90 "

Heavy Band Iron.

7 to 10 x ¼ to 5-16	.70 extra.
6¼ to 6¾ x ¼ to 5-16	.50 "
4¼ to 6 x ¼ to 5-16	.30 "
1½ to 4 x ¼ to 5-16	.20 "
1 to 1¾ x ¼ to 5-16	.30 "
¾ to 15-16 x ¼ to 5-16	.50 "
⅝ to 11-16 x ¼ to 5-16	.80 "
⅞ to 9-16 x ¼ to 5-16	1.00 "
⅜ to 7-16 x ¼ to 5-16	1.50 "

Heavy bands, 7-32 in. thick 1-10 c. per lb. higher than ¼ to 5-16 thick. **Bevel Edge Shaft Iron** 1-10 higher than same size of Heavy Bands.

Light Band Iron.

7 to 8 x No. 9 to 3-16	.90 extra
7 to 8 x Nos. 10, 11 and 12	1.00 "
6¼ to 6¾ x No. 9 to 3-16	.70 "
6¼ to 6¾ x Nos. 10, 11 and 12	.80 "
4¼ to 6 x No. 9 to 3-16	.50 "
4¼ to 6 x Nos. 10, 11 and 12	.60 "
1¼ to 4 x No. 9 to 3-16	.40 "
1¼ to 4 x Nos. 10, 11 and 12	.50 "
1 to 1 3-16 x No. 9 to 3-16	.50 "
1 to 1 3-16 x Nos. 10, 11 and 12	.60 "
13-16 to ⅞ x No. 9 to 3-16	.60 "
13-16 to ⅞ x Nos. 10, 11 and 12	.70 "
11-16 to ¾ x No. 9 to 3-16	.80 "
11-16 to ¾ x Nos. 10, 11 and 12	.90 "
9-16 to ⅝ x No. 9 to 3-16	1.00 "
9-16 to ⅝ x Nos. 10, 11 and 12	1.10 "
7-16 to ½ x No. 9 to 3-16	1.30 "
7-16 to ½ x Nos. 10, 11 and 12	1.40
⅜ x No. 9 to 3-16	1.50
⅜ x Nos. 10, 11 and 12	1.60

Bevel Edge Box Iron.

Same as Light Bands, of same sizes.

Beaded Band Iron, 1¼ in. to 2 in.

Sand Band Iron, 1-10 c. above same sizes o Light Bands.

Oval Iron.

⅞ to 1½	.40 extra.
¾ to 13-16	.50 "
⅝ to 11-16	.60 "
½ to 9-16	.80 "
⅜ to 7-16	1.10 "
½ to 9-16 x 3-16	1.00 "
⅜ to 11-16 x ⅛	1.20 "

Half Oval and Half Round.

2¼ to 3	.60 extra
⅞ to 2	.50 "
¾ to 13-16	.70 "
⅝ to 11-16	.90 "
½ to 9-16	1.20 "
⅜ to 7-16	2.50 "
5-16	3.50 "
¼	4.50 "

Half Ovals less than ¼ their width in thickness, extra price.

Horse Shoe Iron.

All sizes 1 c. extra.

Cutting ordinary bars to specified length, .20 to .30 extra, according to length and size.

Steel Bands.

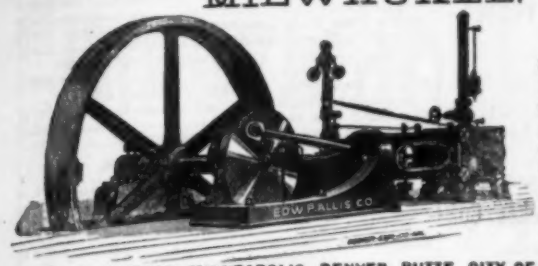
Width In Inches.	English Standard Gauge.		
1 1-2 to 6,	Nos. 7, 8, 9 or 3-16 "	1.50	Base.
		Extras.	
1¼ to 6,	" 10, 11, 12 or ¼"	.05	per 100 lbs.
1 to 1¾,	" 7, 8, 9 or 3-16"	.10	"
1 to 1¾,	" 10, 11, 12 or ¼"	.15	"
13-16 and ⅞,	" 7, 8, 9 or 3-16"	.20	"
13-16 and ⅞,	" 10, 11, 12 or ¼"	.25	"
11-16 and ¾,	" 7, 8, 9 or 3-16"	.30	"
11-16 and ¾,	" 10, 11, 12 or ¼"	.35	"
9-16 and ⅝,	" 7, 8, 9 or 3-16"	.40	"
9-16 and ⅝,	" 10. 11, 12 or ¼"	.45	"
½, Nos.	7, 8, 9 or 3-16"	.55	"
½, "	10, 11, 12 or ¼"	.60	"
7-16 "	7, 8, 9 or 3-16"	.75	"
7-19 "	10, 11, 12 or ¼"	.85	"
⅜, "	7, 8, 9 or 3-16"	.95	"
⅜, "	10, 11, 12 or ⅛"	1.05	"

Iron and Steel Hoops.

Width Inches.	English Standard Gauge.		
7-16 to 3	Nos. 13, 14, 15 and 16	1.60	Base
		Extras.	
7-16 to 2,	" 17, 18, and 19	.05	per 100 lb.
7-16 to 2,	" 20	.10	"
7-16 to 2,	" 21	.15	"
7-16 to 1¼,	" 22	.25	"
¼ to 1¼,	" 13, 14 and 15	.05	"
¼ to 1¼,	" 16, 17 and 18	.10	"

THE EDWARD P. ALLIS COMPANY

MILWAUKEE, WIS.



MANUFACTURERS OF

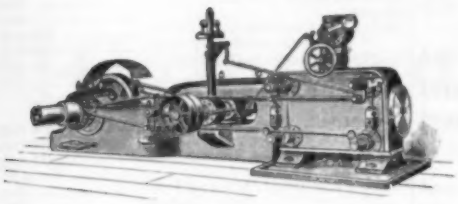
Blowing Engines, Hoisting Engines, Pumping Engines Air Compressors, Special Engines for Electric Lighting Street Railways and Rolling Mills, Ore Crushers, Crushing Rolls, Stamp Mills Concentraters, General Mining Milling and Smelting Machinery.

Reynolds Corliss Engines.

NEW YORK. CHICAGO. MINNEAPOLIS. DENVER. BUTTE. CITY OF MEXICO. SAN FRANCISCO. PITTSBURG.

THE LANE & BODLEY CO.,

CINCINNATI, OHIO.



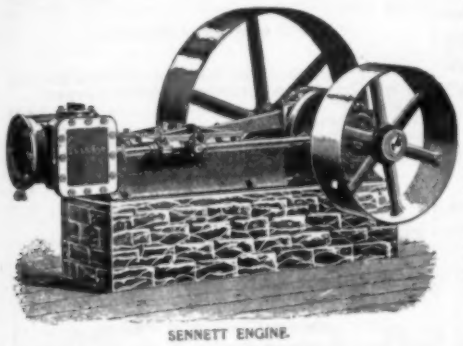
Engines,

ALL SIZES.

Simple and Compound.

Shafting, Hangers, Pullevs.

Belt Elevators, Saw Mills.



SENNETT ENGINE.

THE GEO. B. SENNETT CO.

YOUNGSTOWN, OHIO.

MANUFACTURERS OF THE

Sennett Slide Valve Engine.

A well made and durable center crank engine of from 20 to 40 H. P. The design is thoroughly modern and all parts are made in duplicate.

Engines kept in stock ready to run.

Catalogues or prices willingly furnished. Among our other specialties is the

Sennett Compression Couplings.

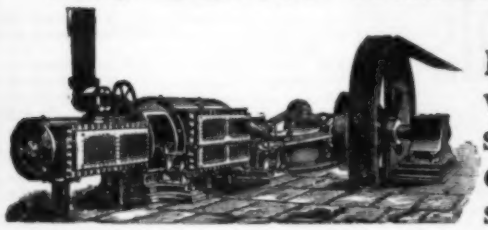
(See advertisement next week.)

Foundry contracts solicited for Castings from 10 lbs. to 5 tons each.

WILLIAM TOD & CO.

YOUNGSTOWN, OHIO.

The Porter-Hamilton Engine



Reversing Engines, Blowing Engines, Converters, Hydraulic and special heavy machinery for the iron and steel trades.

Williams Improved Vertical Engines

For Direct Electrical and all High Class Work.

89-41 Cortland St., N. Y. E. P. WILLIAMS

Park Building, Pittsburg, SEWARD S. BABBITT.

Who builds the best Mine Pump?

PRESCOTT.

Fred. M. Prescott Steam Pump Co.,

MILWAUKEE, WIS.

1⅛ to 1¼,	"	19 and 20	per 100 lbs.
1⅛ to 1¼,	"	21	.20 "
1⅛ to 1¼,	"	22	.30 "
15-16 and 1,	"	13, 14 and 15	.10 "
15-16 and 1,	"	16, 17 and 18	.15 "
15-16 and 1,	"	19 and 20	.20 "
15-16 and 1,	"	21	.25 "
15-16 and 1,	"	22	.35 "
¾, Nos.		13, 14 and 15	.20 "
¾, "		16, 17 and 18	.25 "
¾, "		19 and 20	.30 "
¾, "		21	.35 "
¾, "		22	.45 "
¾ and 13-16 Nos.		13, 14 and 15	.30 "
¾ and 13-16 "		16, 17 and 18	.35 "
¾ and 13-16 "		19 and 20	.40 "
¾ and 13-16 "		21	.45 "
¾ and 13-16 "		22	.50 "
¾ and 13-16 "		23	.60 "
11-16, Nos.		13, 14 and 15	.35 "
11-16, "		16, 17 and 18	.40 "
11-16, "		19 and 20	.50 "
11-16, "		21	.60 "
11-16, "		22	.70 "
11-16, "		23	.80 "
⅝, Nos.		13, 14 and 15	.40 "
⅝, "		16, 17 and 18	.45 "
⅝, "		19 and 20	.55 "
⅝, "		21	.65 "
⅝, "		22	.75 "
⅝, "		23	.85 "
9-16, "		13, 14 and 15	.45 "
9-16, "		16, 17 and 18	.50 "
9-16, "		19 and 20	.60 "
9-16, "		21	.70 "
9-16, "		22	.80 "
9-16, "		23	.90 "
½, "		13, 14 and 15	.55 "
½, "		16, 17 and 18	.60 "
½, "		19 and 20	.70 "
½, "		21	.80 "
½, "		22	.90 "
½, "		23	1.00 "
7-16, "		13, 14 and 15	.80 "
7-16, "		16, 17 and 18	.90 "
7-16, "		19 and 20	1.00 "
⅜, "		13, 14 and 15	1.00 "
⅜, "		16, 17 and 18	1.10 "
⅜, "		19 and 20	1.20 "

Sheet Iron.

No. 10	1 50
No. 12	1 70
No. 14	1 60
No. 15-17	1 75
No. 18	1 85
No. 20	2 00
No. 22-24	2
No. 25-26	2 20
No. 27	2 30

English Tool Steel.

Jessop's	15¾c
Hobson's "Best"	15¾c
" "Choice"	35c

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 35
Shell	1 45
Flange	1 55
Marine Flange	1 60
Fire Box	2 05

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special.

Flats.	cts. lbs.
2 to 9-16 in. wide by 2 to ⅝ thick	.08

Bessemer and O. H. Steel.

Bessemer Machinery	base price,	1 40
Open-hearth Tire	"	1 45
Open-hearth Spring	"	1 80
Sleigh Shoe	"	1 45
Toe Calk	"	1 90
Cutter Shoes, tapered and bent	"	1 60

American Cast Tool Steel.

ROUND, SQUARE, AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	.08
9-16 to ⅞ in. "	.08
7-16 to ⅜ and 2⅜ to 3 in	.09
3⅛ to 4 in	.09½
⅞ to 11-16 and 4⅛	.10
⅛ to 6 in	.10½
¼ to 9-32 and 6⅛ to 7 in	.11
1 in	.13

Burden Boiler Rivets.

⅛, ⅜, 11-16 and ¾ inches diameter	3 co
Bridge ⅛, ⅜, 11-16 and ¾ inch diam	2 55

Wrought Pipe and Boiler Tubes.

Lap weld black, base, and 10 per cent	.78
Butt " " " "	.72
Lap " galv. " "	.70
Butt " " " "	.67
Boiler tubes 2¼" and smaller	.72½
Boiler tubes 2¼" and larger	.72
Casting screw and socket joint	dis. 50
Casing inserted joint	dis. 45

MACHINERY SUPPLY MARKET.

[From Store, Cleveland.]

Anti-Friction Metals.

Magnolia Anti-Friction Metal, 25 cts. per lb., f. o. b. New York or Chicago.

No Name Metal, 15 cts. per lb., f. o. b. New York or Chicago.

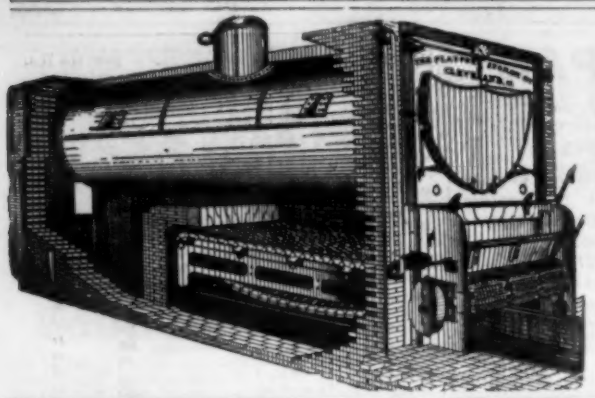
Mystic Metal. 10 cts. per lb., f. o. b. New York o Chicago.

Anvils.

American	9 lb 9 81
Wright's	9 lb 12

Bellows.

Blacksmiths'	Hill's	dis
	Bullock's	dis 50&10
Moulders'		dis 40&40&10
Hand		dis 40&10&50



The Playford Mechanical Stoker

Guaranteed to

Abolish smoke, to increase boiler capacity and to save fuel.

For information, address,

The Playford Stoker Co.,

404 Telephone Bldg.,

CLEVELAND, O.

IRON CLAD PAINT CO.

Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g.

CLEVELAND, OHIO.

ORDER DIRECT FROM THE

Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

We Claim The Following Merits for Jenkins Bros.' Valves

1. Manufactured of the best Steam Metal.
2. No regrinding, therefore not constantly wearing out the Seat of the Valves.
3. Contain JENKINS DISC, which is suitable for all Pressures of Steam, Oil and Acids.
4. The Easiest Repaired, and all parts Interchangeable.
5. Every Valve Tested before leaving the factory.
6. ALL GENUINE stamped with Trade Mark,

(2)

JENKINS BROTHERS, NEW YORK, PHILADELPHIA, CHICAGO, BOSTON.

Dixon's Pure Flake Graphite

Is a Blessing to Every Engine Room and Machine Shop.

A small quantity added to any Oil or Grease largely increases its lubricating value and makes the finest Cooling Mixture.

Pamphlet and Sample Sent Free.

JOS. DIXON CRUCIBLE CO., Jersey City, N. J.

FOR GREAT TENSILE STRENGTH, ELASTICITY AND ELONGATION, COUPLED WITH UNUSUAL NON-CORROSIVE QUALITIES,

Castings and Propeller Wheels

MADE FROM

PARSONS MANGANESE BRONZE

CANNOT BE EXCELLED. WRITE FOR PARTICULARS.

SOLE MAKERS,

THE WILLIAM CRAMP & SONS

Ship and Engine Building Company,

PHILADELPHIA, PA.

A paper that is paid for and read—THE IRON TRADE REVIEW.

Belting.

Boston Belting Co.'s standard	dis 70 & 10
" " " extra	dis 60&10
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 50
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 50
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 33⅓
Horton's Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 45
Sweetland "	dis 40
Almond Drill	dis 40
Morse "	dis 20
Skinner's Combination Lathe	dis 40&15
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 30

Cutters and Reamers.

Cleveland	dis 10@1
Pratt & Whitney	dis 10@1
Standard	dis 10@1
Morse	dis 10 to 1
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	₩ 3½
Iron, steel points	₩ lb 1

Drill and Drill Sockets.

Twist Drills	
Morse Taper & Straight Shank to 1¼"	dis 50 & 10 to 60
Morse Taper and Straight Shank Larger than 1¼"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 60@60&5
Cleveland " "	dis 60@60&5

Emery.

	No. 4 to No. 46 gr.	No. 54 to 150 gr.	Flour, C. F F. F
Kegs, ₩ lb	4½c	5 c	2¾c
½ kegs ₩ lb	4¾c	5¼c	2¾c
¼ kegs ₩ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	c
10 lb cans less than 10	10 c	10 c	½c

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

Detroit	dis 60@70
Norton's	dis 60@70
Crant	dis 60@70
Sterling	dis 60@70
Celluloid	dis 10&33⅓
Northampton	dis 50
Crystal	dis 65@70
Vitrified	dis 60@70
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70
Western	dis 70
Stub's	dis 2
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 55
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	10c
" " " " over 5 lbs	8c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15⅝	11⅛	8¼	6	5⅛	5⅛	
Washers	9	8	7	5	4½	4½	4⅛

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

Standard Penny Nails, ₩ keg, base.

Car lots	$1.30
Less than car lots	$1.40

Oilers.

Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2 $4.00; No. 3, $4.40 ₩ doz	dis 10@10&15

Picks.

Railroads, 5 to 6 lbs	dis $12 60
" 6 to 7 lbs	dis $13 60

American Tin Plate Company

MANUFACTURERS OF

Coke Tin Plates,
Charcoal Tin Plates,
High Grade Terne Plates,
Black Plates.

CENERAL OFFICES:

Marquette Building.

CHICAGO, ILL.

Established 1853.

Refined Malleable Iron Castings

MANUFACTURED BY

Our Characteristics:

Uniformity,
Strength,
Finish,
Prompt Deliveries.

Reverberatory Furnaces only.

Annealed by Improved method.

Annual Capacity 6000 tons.

WALTER A. WOOD MOWING AND REAPING MACHINE CO., HOOSICK FALLS, N. Y.

(Seymour, Santvoord & Danforth Geer, Receivers.)

Rivets.

Iron, Thousand, list November 1, 1894	dis 60@60
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894	dis 60@65
Copper	dis 50@50&15

Taps.

Cards, Hand and Nut to 2 in.	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in.	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

List, Apr. 9, 1894

Brass	dis 35c
Copper	dis 35c
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65& 5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	95c ℔ dis 30

ECLIPSE ELECTROTYPE AND ENGRAVING CO.
58 FRANKFORT ST.
TELEPHONE MAIN-1916 CLEVELAND, OHIO.

THE CENTRAL ELECTROTYPE AND ENGRAVING CO.
263-271 St. Clair St. Cleveland, O.
WOOD ENGRAVING
ELECTROTYPING.

THE WELLMAN-SEAVER ENGINEERING CO.,
CONSULTING AND CONTRACTING ENGINEERS,
New England Building, - - - - - Cleveland, O.

Steel Works, Rolling Mills, Metallurgical Furnaces, Manufacturing Buildings, Machinery for the most economical handling of all kinds of material.

MONON ROUTE
Chicago Indianapolis & Louisville Railway

THE
DIRECT LINE
BETWEEN
Chicago . .
Indianapolis
Cincinnati .
Lafayette . .
Louisville . .
AND ALL POINTS
SOUTH

For time table and other information, address
FRANK J. REED, General Passenger Ag't,
CHICAGO.

Cleveland, Lorain & Wheeling
Railroad Company.

Time Table effective May 15th, 1898.
Cleveland Depot: Foot of South Water Street.
Elyria Depot: Huron St., West Side.

South Bound.			Central Standard. Lorain Branch	North Bound.		
15	13	11		12	14	16
P.M.	P.M.	A.M.	LV. AR.	A.M.	A.M.	P.M.
4:25	2:25	6:27	Lorain	9:15	11:35	7:30
4:40	2:30	6:44	Elyria.....	9:00	11:21	7:16
4:56	2:55	7:04	Grafton	8:43	11:07	6:58
5:15	3:12	7:23	Lester.....	8:25	10:50	6:40
5	3	1	Main Line	2	4	6
5:30	2:25	7:20	Cleveland ...	8:30	11:50	7:15
5:47	2:41	7:36	Brooklyn	8:14	11:34	7:01
6:42	3:26	8:22	Lester.....	7:29	10:49	6:19
6:52	3:35	8:30	Medina.....	7:16	10:37	6:07
7:05	3:46	8:41	Chippewa La	7:04	10:26	5:55
7:20	4:01	8:56	Sterling.....	6:48	10:12	5:40
8:09	4:46	9:45	Massillon	6:00	9:23	4:54
8:55	5:31	10:34	Canal Dover.	5:11	8:36	4:10
9:02	5:38	10:41	New Philade	5:04	8:28	4:03
9:20	6:05	11:25	Uhrichsville	4:45	8:10	3:45
.....	8:10	1:30	Bridgeport....	.....	6:05	1:40
.....	8:25	.....	Bellaire.....	.....	5:50	.....
P.M	P.M.	P.M.	AR. LV.	A.M.	A.M.	P M.

No. 9 leaves Lorain 9:50 a.m., Elyria 10:05, Grafton 10:21; arrives Lester Junction 10:40. No. 10 leaves Lester Junction 3:25 p.m., Grafton 3:42, Elyria 3:57; arrive Lorain at 4:10 p.m.

Trains 1, 2, 5 and 6 daily between Cleveland and Urichsville All other trains daily except Sundays. Electric cars between Bridgeport and Wheeling, and Bridgeport and Martins Perry and Bellaire. Consult agents for general information as to the best routes and passenger rates to all points. M. G. CARREL, G. P. A.,
Hickox Bldg., Cleveland, O.

When writing to advertisers please mention The Iron Trade Review.

For a Summer Cruise
. . . take the
Coast Line to MACKINAC.
NEW STEEL PASSENGER STEAMERS,
SPEED, COMFORT AND SAFETY.

The greatest Perfection yet attained in Boat construction: Luxurious Equipment, Artistic furnishing, Decoration and Efficient Service.

To DETROIT, MACKINAC, GEORGIAN BAY, PETOSKEY, CHICAGO.

No other line offers a Panorama of 460 miles of equal variety and interest.

Four Trips Per Week Between
TOLEDO, DETROIT AND MACKINAC, PETOSKEY, "THE SOO," MARQUETTE AND DULUTH.

LOW RATES to Picturesque Mackinac and Return, including Meals and Berths. Approximate Cost from Cleveland, $17; from Toledo, $14; from Detroit, $13.50.

Every Day and Night between
Cleveland, Put-in-Bay and Toledo.

Day and Night Service between
CLEVELAND AND DETROIT.
Fare, $1.50 each Direction.
Berths, 75c., $1. Stateroom, $1.75.

Connections are made at Cleveland with Earliest Trains for all points East, South and Southwest, and at Detroit for all points North and Northwest.

Sunday Trips May, June, July and August, September and October only.

Send 2c. for Illustrated Pamphlet. Address
A. A. SCHANTZ, G. P. A., DETROIT, MICH.
Detroit and Cleveland Navigation Company.

A large and growing circulation among machine shop and foundry firms, has
THE IRON TRADE REVIEW.

The Cleveland Terminal & Valley R. R. Co
(B. & O. System.)

Depot foot of So. Water St. City Office 241 Superior St.	Arrive.	Depart.
Valley Jct'n. & Way Stations..	*6:25 P M	*7:25 A M
Marietta, Wheeling & Chicago	†9:25 P M	†7:25 A M
Cleveland Press Special.....	†9:25 P M	†2:00 P M
Akron, Canton & Wheeling...	*10:20 A M	*3:30 P M
Akron, Canton & Chicago.	*8:05 A M	*6:35 P M
Akron, Canton & Marietta,...	†2:10 P M	†11:00 A M
Pittsburg, Washington, D. C., & Baltimore.....	*11:30 A M	†2:00 P M
Akron Theatre Train.....		†11:10 P M

†Daily except Sunday. *Daily. Pullman's Palace Vestibule sleeping cars between Cleveland and Chicago, also Cleveland and Baltimore.

When you write to firms advertised in our columns, please mention the fact that you took their address from our paper. They will thank you for it.

DIRECTORY

To the Iron and Steel Works of the United States for 1898.

PUBLISHED BY
THE AMERICAN IRON AND STEEL ASSOCIATION.

Thoroughly Revised. Price, Seven Dollars.

The American Iron and Steel Association has just completed a thorough revision of its Directory to the Iron and Steel Works of the United States, bringing down to April, 1898, a description of these works. It also contains a complete Directory to many leading industries which are large consumers of iron and steel. This edition, which is the fourteenth that has been issued, embraces more complete details of all the iron and steel works of the United States, and of industries which are large consumers of iron and steel, than any preceding edition. It retains all the old features of preceding editions and contains many new features.

In the edition for 1896 there was given for the first time a complete list of Malleable Iron Works in the United States, and to this new feature there are now added complete lists of the Rail Mills, Structural Mills, Steel Casting Works, Bolt, Nut and Rivet Works, Chain Works, Seamless Tube Works, and Riveted Pipe Works—all new features.

The lists of Plate and Sheet Mills and of Tin Plate and Stamping Works are much more complete than in previous editions. The names and location of all the works described are given in alphabetical order, followed by a description of their character, capacity and products, with the names of the principal officers, etc., including the names of selling agents. This edition makes a cloth-bound book of nearly 400 well-printed pages—many more than in any previous edition. It contains a complete list of all the

Blast Furnaces,
Rolling Mills,
Bessemer Steel Works,
Open-Hearth Steel Works,
Crucible Steel Works,
Plate and Sheet Mills,
Rail Mills,
Structural Mills,
Steel Casting Works,
Cut-Nail Works,
Tin Plate Works,
Stamping Works,
Forges and Bloomaries,
Wire Rod and Wire Mills,
Wire Nail Works,
Iron and Steel Bridge Builders,
Iron and Steel Ship Builders,
Horse-Nail Works,
Locomotive Works,
Malleable Iron Works,
Cast Iron Pipe Works,
Cast Iron Soil and Plumbers' Pipe Works,
Wrought Iron, Wrought Steel and Riveted Pipe Works,
Seamless Tube Works,
Chain Works,
Bolt, Nut and Rivet Works,
Car Axle Works,
Car Wheel Works, and
Car Builders in the United States

ALSO A LIST OF THE

Iron and Steel Works in Canada and Mexico.

This edition of the Directory is an invaluable book of reference for all business men who wish to correspond with iron and steel manufacturers or with iron and steel consumers, forming, in every respect, a COMPLETE GUIDE to the iron and steel works of this country and to the principal works which consume iron and steel.

Sent postpaid, on receipt of price, by

THE IRON TRADE REVIEW CO.,
PITTSBURG, CLEVELAND, CHICAGO

PHOENIX HORSE SHOE C ..

Phoenix Horse Shoes are known of everywhere as the best. The superior quality of material and excellence of manufacture are beyond all question. They have no equal.

JOLIET, ILL. AND POKEEPSIE N. Y.

WEST AND SOUTH

run the lines of the Illinois Central Railroad and the Yazoo & Mississippi Valley Railroad, reaching into the eleven States of

South Dakota	Kentucky
Minnesota	Tennessee
Iowa	Arkansas
Wisconsin	Mississippi
Illinois	Indiana Louisiana

Presenting an unequaled territory for diversified industries, and possessing

Fine Sites for New Mills

Best of Freight Facilities,—Coal Fields,

Close Proximity to Distributing Centers,

Intelligent Help of All Kinds,

Many Kinds of Raw Material.

To sound industries, substantial inducements will be given by many of the places concisely described in the pamphlet "100 Cities and Towns Wanting Industries." Write for a copy. Nearly all kinds of industries are wanted. Very liberal inducements are offered TEXTILE INDUSTRIES in the South by a number of good places. GEORGE C. POWER, Industrial Commissioner I. C. R. R. Co., Chicago. 1. 2-98.

Steel Stamps and Stencils.

FULKHARTY, J. H. & Co., Rubber Stamps Seals, Stencils, Automatic Check Punches and Numbering Machines. 92 Seneca St.

If you are thinking of enlarging your mill, foundry or machine shop, or of purchasing machinery of any kind, send us a line giving character of machinery needed. We can put you in communication with manufacturers from whom you can buy advantageously.

Nickel Steel

THE ACME OF SCIENTIFIC EXPERIMENT

.....Has proved to be a Perfect Success

For Marine Engine Forgings and Shafting.

The shafts of the peerless "OREGON" } Were "Bethlehem"
The shafts of the fleet "FARRAGUT" } Forgings.

Send for Pamphlet on Marine Engine Forgings.

THE BETHLEHEM IRON CO., South Bethlehem, Pa.

BRANCH OFFICES:
100 Broadway, New York. 421 Chestnut St., Philadelphia. 1433 Marquette Bldg., Chicago.

National Tube Works Company,

MILLS AT McKEESPORT, PA.

The largest makers of Special Mild Steel and Wrought Iron Pipe, Boiler Tubes and Casing in the World. From ore to finished product. Sizes from ⅛ of an inch to 30 inches.

SALES HOUSES:

Pittsburg, Chicago, St. Louis, New York, Boston.

Hydraulic Pressed Forging.

WYMAN & GORDON, Worcester, Mass.
New York Office: 116 Liberty st.

DROP FORGINGS.

KING'S SIX TON ELECTRIC CRANE
Can be furnished at low cost.
Write for full information to the MARION STEAM SHOVEL CO Marion, Ohio.

The A B C of Iron.—A book for foundrymen. It is issued in cloth binding, and gives much valuable matter on how to reduce cost of mixtures, and on grading and numbering of pig iron. CHAPTER HEADINGS:—Iron—What is it? Pig Iron. Constituents of Iron. Numbering of Pig Iron. Grading of Iron. How to Reduce Cost of Mixture. Steel. Physical Properties of Metals Defined. Statistics. Early History and Manufacture of Iron. Former price $2.00, NOW $1.00. Order of *The Iron Trade Review Co.*, 27 Vincent St., Cleveland, O.

B. P. CRANE & CO.

TERNE AND TIN PLATES.

L. D. Telephone, MAIN 841. 205 LA SALLE ST.

CHICAGO.

PIG IRON

Spearman Iron Company,

Sharpsville, Pa.

Inspected Foundry Irons. Softness, Strength, Fluidity, Uniformity.

American Scotch
brand unequaled.

HENDERSON & TRAGO, Agents,
CLEVELAND, O.

The Practical Brass and Iron Founder's Guide.

A treatise on brass founding, molding, the metals and their alloys, etc. By JAMES LARKIN, late conductor of the brass foundry department in the Penn Works, Philadelphia. A new revised and greatly enlarged edition. Contents: Among the most important and entirely new sections of this edition of this valuable and popular book are the following: Behavior of Metals and Alloys in Melting and Congealing; Malleable Iron Castings; Wrought Iron or Mitis Castings; Manufacture of Steel Castings; Casting of Brass; Casting of Bronze; Bell Founding; Chill Casting; Casting without Core; Casting onto Other Metals; Casting Iron and Other Metals upon Lace, Embroideries, Fern Leaves and Other Combustible Materials; Some Modern Bronzes. In one volume; 12mo; 400 pages . . $2.50

Sent postpaid on receipt of price by

The Iron Trade Review Co.,

CLEVELAND.
CHICAGO.
PITTSBURG.

DETROIT
Emery-Corundum WHEELS,
Sellers' Tool and Twist Drill Grinders.

J. WENDELL COLE,
P. O. Box 84, COLUMBUS, OHIO.
911 No. 112 Clark St., CHICAGO, ILL.

BAUSH & HARRIS MACHINE TOOL CO.,
Springfield, Mass.

Manufacturers of
Radial Drills,
Multiple Spindle Drills,
Universal Radial Drills,
Boring and Turning Mills.

HIGH GRADE ONLY. Write for Prices.

Meehan Boiler & Construction Co.,
LOWELLVILLE, OHIO,
MANUFACTURERS OF
MEEHAN'S COMBINED SAFETY and WATER TUBE BOILER.
All kinds of Blast Furnace, Steel Plants and Stand Pipe Work.
Also all kinds of Oil Refinery and Tank Work.
WROUGHT IRON WELDED and RIVETED ANNEALING BOXES.
Structural and Engineering Work.

The "ORIGINAL GANDY"
Stitched Cotton Duck Belting,
Especially adapted for Main Drivers, Saw Mills, Cotton Gins, Cotton Presses, and for all places where belts are subjected to moisture or atmospheric changes, the "GANDY" stands paramount.
For further information, prices, etc., write
The GANDY BELTING CO., Baltimore, Md.

METHODS FOR THE ANALYSIS
— OF —
ORES, PIG IRON and STEEL
IN USE AT THE
Laboratories of Iron and Steel Works in the Region about Pittsburg, Pa.

Together with an Appendix containing various special methods of analysis of ores and furnace products.

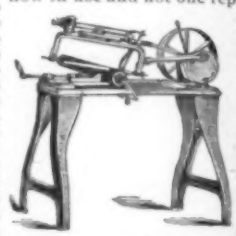
Contributed by the Chemists in charge, and edited by a Committee of the Chemical Section, Engineers' Society of Western Pennsylvania.

Bound in Cloth, - - - - $1.00
Bound in Paper, - - - - .75

THE IRON TRADE REVIEW CO., Chicago, Cleveland, Pittsburg.

All Steel & Case Hardened
THE PARALLEL CLAMP
All Angles
FINE TOOLS & METAL WORKERS SUPPLIES
10-12 N. CANAL ST.
C. H. BESLY & CO
CHICAGO ILL. U.S.A.

The STAR Hack Saw Machine
FOR CUTTING METALS of all kinds up to 4½ inches in diameter. Several thousands are now in use and not one report has reached us that has not been complimentary. They are automatic, stopping themselves when cut has been made and no further attention is required than to adjust the work at the start. A man at work on some other machine usually attends to this. No shop can afford to be without one or more. They will save their cost over and over again. **Price $25.00.**



Millers Falls Co., 93 Reade St., New York.

Send for Photograph and Low Price.

A large and growing circulation among machine shop and foundry firms has
THE IRON TRADE REVIEW.

OILLESS BEARINGS

For Loose Pulleys and other bearings. Perfectly clean. No cutting. No danger of fire from overheating. Send for Loose Pulley circular.
No. American Manufacturing Co.
40 to 48 Third Street, Long Island City, N. Y.

Fire Brick, Fire Clay, Pig Iron
F. B. STEVENS, Detroit, Mich.

Molders' Text Book
Being Part II of American Foundry Practice, giving the best methods and rules for obtaining good castings, with detailed description for making molds. A thoroughly practical book that should be in the hands of every molder. By Thomas D. West. 460 pages, cloth..... $2.00

Sent, postpaid on receipt of price, by
The Iron Trade Review Co.
CHICAGO. CLEVELAND. PITTSBURG.